The Parks Canada

GLASS GLOSSARY

for the description of containers, tableware, flat glass, and closures

Olive Jones and Catherine Sullivan,
with contributions by
George L. Miller
E. Ann Smith
Jane E. Harris
Kevin Lunn

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Olive R. Jones and Catherine Sullivan,
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The majority of the objects illustrated are from Parks Canada's archaeological collections, but also illustrated are objects in the private collections of George L. Miller, Kevin Lunn, Olive Jones, and Catherine Sullivan.

INTRODUCTION

Background

The *Parks Canada Glass Glossary* grew out of an attempt to create a standardized system for the cataloguing of glass artifacts from sites excavated by Parks Canada. Standardization became essential in the mid-1970s when the Parks Canada Material Culture Research section decided to participate in the National Inventory Program, a computerized data storage and retrieval system offered by the National Museums of Canada. Because the National Inventory Program used natural language rather than numerical codes, it was necessary to standardize terminology as much as possible to facilitate computer searches for objects via various traits. Standardization was also extended to traits such as measurements that would not be used in computer searches.

The National Inventory data base was viewed as a pool of potential research data. In designing a cataloguing manual for use with the National Inventory system, therefore, an attempt was made to envisage all possible research questions that might arise related to traits of glass artifacts. The resulting cataloguing process was of course very time consuming and has forced a rethinking of what is essential to record.

Cataloguing

Although there has been a great deal of discussion on classification and typology, well summarized by Hill and Evans (1972), cataloguing as part of the archaeological process has basically been taken for granted and discussion of it in the archaeological literature has been minimal. In some institutions cataloguing is nothing more than putting a provenience number on the artifacts. At the other extreme there are institutions that go into great detail in describing each artifact; cataloguing is treated like the process of excavation, where an attempt is made to record everything because the site cannot be re-excavated. Usually artifacts are not thrown away after they are catalogued, so the need for a complete description of everything that can be gleaned from every fragment is questionable. Anyone attempting to incorporate everything in this glossary into their cataloguing process will be in danger of consuming their budget with only a catalogue of artifacts as a final product. Few projects can afford this luxury if continued funding is expected.

What are some of the considerations involved in cataloguing? First, there is a need for collections management. This includes numbering the artifacts and making an inventory record of the artifacts from each unit to enable a researcher to be sure all artifacts are present when analysis begins. Beyond that basic need, each project should evaluate its own uses for its catalogues and the types of information needed to fulfill those needs. Some researchers use the catalogue as a tool in research but most catalogues are never looked at once completed, unless they are published. If collections are in open storage it is often much faster to visually scan the collections than to read the catalogue records. Another consideration is whether the catalogue is to be of fragments or of objects. Cataloguing fragments can be a quick straightforward process handled by relatively inexperienced lab workers but cataloguing objects requires time and experienced personnel. Determining which fragments represent objects involves identifying functional forms, identifying parts of a whole, and deciding how many of each type of object are present. For example, do the various pieces of wagon hardware in a collection belong to one or to more than one wagon; which bottle necks belong with which bases? If objects are to be catalogued, then the collection requires analysis before the cataloguing process begins. The time and cost involved have to be weighed against the expected results and use.

Different archaeological contexts have varying potential for answering questions about the past and require different types of information and research input. For example, if a site is known to have been occupied for 5 years then dating the site using the artifacts would be of questionable value. The artifacts could, however, be used to test already-established chronologies or to study time lag or artifact use life. Nor do all excavated units need be given the same degree of treatment; treatment should depend on the unit's ability to contribute to interpretation of the site. Post-occupation fill from an unknown source, for example, would contribute very little

information. It would be appropriate to recognize different levels of cataloguing treatment for different types of contexts keeping in mind the project research questions when selecting information to be collected and recorded.

The above comments relate to site interpretation. Beyond that lies the area of artifact research. With the introduction of computers, archaeological catalogues have the potential to become accessible to researchers from institutions other than the one creating the catalogue. In addition to providing access to stored information, the computerized catalogue record can facilitate research questions involving correlation, distribution, and seriation which are essential for studies of chronology, typology, and technology. Many other questions related to and growing out of these interests can be thought of, along with other research objectives such as pattern recognition and studies of association. It is probable that almost every trait that can be identified for glass containers and tableware could be of use for some research problem. However, the amount of time required for cataloguing, and the cost of data entry into the computer, prevent such a universal approach.

Once again it is up to the research organization to establish what the objectives are in terms of research, and what present and future obligations will be undertaken to provide information to other researchers. For example, efforts made to record traits used in establishing chronologies for objects rarely recovered from archaeological sites would not be a productive use of time. One cannot hope to cover all research questions that could come up, and extensive descriptive cataloguing should not be substituted for research. (For a discussion of the use of the computer in museum cataloguing see Chenhall 1975.)

The Glossary

The *Parks Canada Glass Glossary* reflects the types of glass containers and tableware recovered from sites excavated by Parks Canada. These sites include French and British military forts and outposts, fur trade sites, domestic and industrial sites, and shipwrecks. In time period the bulk of the collections date from the 18th and 19th centuries. The vast majority of the glass used in Canada was imported, first from France, then Britain, and later and to a lesser extent from the United States. Other countries were also sources of glass but not to any extent. Glass made in Canada did not become a major factor until the second half of the 19th century.

The format of this glossary is loosely based on the artifact cataloguing form adopted by the Archaeology Research Division, National Historic Parks and Sites Branch, Ottawa. Terms are listed under the appropriate subject headings, not alphabetically. The reader will not find in the glossary an explanation or definition of each heading. nor has any attempt been made to persuade the reader that the subject breakdowns are the best ones for a catalogue record. However, the overall organization is intended to encourage the use of a structured catalogue record. Information in Part I deals with general aspects of glass artifacts, such as their colour, condition, and manufacturing techniques. Parts II-V deal with aspects specific to containers, tableware, closures, and flat glass.

The glossary is intended as a reference tool for people inventorying, cataloguing, researching, and discussing glass artifacts, specifically containers, tableware, closures, and flat glass. It provides guidance on terminology, measurements to take, and attributes to describe. It is intended to assist in making Parks Canada's records and reports consistent in terminology and usage, and thus to help make one researcher's work comparable with another's. It is not a cataloguing manual, although it is an indication of what we are likely to include in the catalogue record.

The terminology, measurements, and attributes were chosen from several types of sources: documentary sources, such as glassmakers' catalogues; government and official glass industry publications; usages developed over the past years by the glass unit at Parks Canada; research undertaken by that unit; and numerous secondary sources. A number of problems were encountered in selecting the "right" term from these sources. For example, some widely used terms are too vague to be meaningful; other terms have changed in meaning over time; different terms were often used for the same attribute; and changes in the glass artifacts themselves made certain terms obsolete.

The final choices of terminology, attributes, and measurements were based on expediency and the following considerations:

Research potential — Attributes and measurements were chosen which help to esta-

blish function, ascription, and date of manufacture.

Common usage — Many terms have been established over the years, both in the literature and in the glass unit. Whenever possible these were kept. In instances where the terms are inaccurate but are commonly understood, they were kept (e.g. "wine" bottle).

Consistency — Some terms, although unsuitable in some way, were retained. For example, for late-18th century glassware, "down-tooled" lip describes both the manufacturing technique and the shape. For 19th and 20th century glassware, however, when finishing tools and machines were in use, the manufacturing aspect is no longer true. But the shape continued to be made and the term has been kept to describe the shape.

Visual reconstruction — Descriptive terms were often chosen to help in visualizing an object when it is not immediately accessible.

Parks Canada archaeological collections — The nature of the archaeological collections (types of glassware commonly recovered and condition of the artifacts) made the elimination of a host of terms and usages possible and necessitated the addition of others.

Accuracy — Terms that gave a clearer representation of an object were chosen over those in common use that are confusing and/or meaningless. Terms with several different usages have been eliminated or defined.

It is hoped that this glossary will be of assistance for those working with glass from archaeological sites.

PART I. GLASS GENERAL

CATALOGUE NUMBER

By Oxford English Dictionary definition, a catalogue is

> Now generally distinguished from a mere list or enumeration by a systematic or methodical arrangement, alphabetical or other order, and often by the addition of brief particulars – descriptive or aiding identification, indicative of locality, position, date, price or the like.

In archaeology, the catalogue number is the basic link between the artifact or object and its provenience and whatever else has been recorded or described about the item. Parks Canada's catalogue numbers are assigned in two parts. The first part consists of a site number and a provenience number. At this level of labelling several artifacts could have identical numbers. If the collection is not being worked with or is being inventoried only, then these numbers are not likely to be added to. However, if an artifact or object is selected for illustration, type collection, or if the provenience unit is being catalogued, it is given an object number. Object numbers have been broadly defined within the Parks Canada cataloguing system. Sometimes the number refers to a part of an object such as a bottle neck or occasionally to a whole bottle. Rarely does the object number represent a minimum vessel or object count. Therefore, adding up the catalogue entries will not provide an object inventory. This is particularly true for sites with large assemblages where, for example, several hundred black glass bottle bases cannot be matched up with a like number of bottle necks.

It is recommended that catalogue numbers be assigned after mending and cross-mending to minimize confusion resulting from multiple numbers.

CATEGORY

For purposes of cataloguing, glassware is divided into several broad functional classifications. Not all of these categories have been discussed in detail in this glossary.

Container – A general term for commercial bottles and jars. However, we also include such items as canning jars, nursing bottles, and toiletry bottles for the dressing table. These last items would have been purchased for use, whereas the commercial containers would have been acquired because of their contents. Containers generally outnumber all other functional types of vessel glass in archaeological assemblages.

Tableware – A general term for vessels used to serve food and drink, and for glassware used on the dining table, such as tumblers, bowls, and pitchers, and for decorative items such as vases. Tableware is generally the second most commonly occurring category of vessel glass in archaeological assemblages. Glass tableware comes in a diversity of shapes and levels of decoration, and can be useful as a tool in studying socioeconomic status. In late-19th and 20th century assemblages there can be some confusion between tableware and containers that were originally packers' ware for jelly, jam, and other products but were used as tumblers when the product was consumed.

Closures – These are separate items associated with containers or with tableware. If a closure is attached to a specific object, the two items should be catalogued together.

Lighting devices – A term used for glass items associated with illumination, such as lamp chimneys, lamps, candlesticks, and light bulbs (Woodhead et al. 1984).

Flat glass – Used for window glass and mirrors and not for fragments of flat-sided containers or tableware. Flat glass occurs frequently in archaeological assemblages.

Miscellaneous glassware – A broad term covering a host of glass objects such as pharmaceutical glassware, marbles, doorknobs, gemstones, clothing items, bird feeders, insulators, and so on.

Unidentified glassware – A term used for glass artifacts whose function cannot at the present be identified but which have potential for identification; it is not used for nondescript fragments of glass.

Undiagnostic glassware — A term used for miscellaneous nondescript glass fragments whose function cannot be determined even in the grossest sense and whose function will probably remain undetermined.

Burnt glass — A term used for glass that has been affected by fire and, as a result, is not identifiable beyond the fact that it is glass. On occasion an object may be recognizable in spite of being burnt and may be catalogued in a specific category. However, fire distorts and melts glass in such a way that the object may look significant when in fact it is not.

MATERIAL

Glass is defined by the British Standards Institution (hereafter referred to as BSI) as "an inorganic product of fusion which has cooled to a rigid condition without crystallizing" (BSI 1962: 6). Characteristically

> Glass is typically hard and brittle and has a conchoidal fracture; it may be colorless or colored, and transparent to opaque; masses or bodies of glass may be made colored, translucent, or opaque by the presence of dissolved, amorphous, or crystalline material (Society of Glass Decorators 1968: 21).

The major component of glass is silica, which in its pure form can be melted to form glass. Its fusion, however, requires such a high temperature that it has never been commercially viable (Newman 1977: 284; Rosenhain 1908: 5-6). Therefore an alkali has traditionally been added to the silica and served as a flux to lower the melting temperature of the silica. As purer raw materials came to be used in an effort to obtain higher and more consistent qualities of glass, it was found that a non-alkaline base had to be added to the batch to replace the natural impurities which had formerly occurred in the alkali and acted as stabilizers (Newman 1977: 184; Douglas and Frank 1972: 25-26). Glass with insufficient amounts of stabilizer suffers from crizzling, a condition found on very early English lead glasses and some 18th century French tumblers and stemware.

By the late-17th century, the three principal components of glass were silica (silicon dioxide, SiO_2), commonly used in the form of sand; flux (alkali), either soda (sodium oxide, Na_2O) or potash (potassium oxide, K_2O); and stabilizer (non-alkaline base), either lime (calcium oxide, CaO) or lead (lead oxide, PbO) (Rosenhain 1908: 35-53). These fluxes and stabilizers, in various combinations with each other, have been used historically to define the main different types of silicate glasses, types that remain in production into the 20th century. These types are soda-lime glass, potash-lime glass, potash-lead glass, and lime glass.

In the 20th century many other types of glasses with different characteristics have been developed. The ability of the researcher to identify the type of glass by visual characteristics alone is limited and not dependable. In this regard colour is particularly unreliable. The only way to be absolutely sure of the glass composition is by chemical analysis, although inferences can be made on the basis of colour, style, and fluorescence once chemical analysis has established that comparable objects are consistently of a particular glass type. The determination of glass composition is most useful for the French period in Canada to help determine country of origin for table glass (see McNally 1979).

Soda-Lime Glass

Also known as soda glass, this is one of the most ancient of glasses and one of the most common. Before the late-18th century, soda was added to the batch in the form of ashes obtained by burning certain marine plants, such as kelp and seaweed. Soda was and is still used as a flux throughout the Mediterranean area, most notably in Venice. Although soda glass normally had a bluish or greenish tint due to impurities being present in the batch, by the 13th century Venetian glassmakers had discovered the secret of colourless glass and soon became famous for their *cristallo*. Soda glass is light in weight and appearance and because it sets up quickly, it lends itself to elaborate forms and decoration. Venetian *cristallo* was so popular and its quality so difficult to imitate that in the 15th and 16th centuries Venetian glassmakers were enticed to set up shops in other European cities. A style of table glass known as *à la façon de Venise* was soon being made in all of the major European glass centres. This style, made in

soda-lime glass with soda imported chiefly from Spain, remained the dominant one until colourless potash glasses were perfected in England and Bohemia in the late-17th century.

In 1787 a Frenchman, Nicholas LeBlanc, developed a chemical process to convert common salt (sodium chloride) into soda. This process provided a purer, more dependable, and more readily available flux than that derived from plant sources (Douglas and Frank 1972: 23; Biser ca. 1899: 30). Thus, during the 19th century soda was the preferred flux for making bottles, window glass, and lampshades in European countries (Douglas and Frank 1972: 40). The use of soda was further increased by the development in 1863 by a Belgian, Ernest Solvay, of the ammonia process of producing soda (Biser ca. 1899: 30). This process was simpler, more effective, and cheaper than the LeBlanc process.

As far as table glass is concerned, by the end of the 19th century soda-lime glass was gradually replacing potash-lead glass. This was undoubtedly due in part to the improved processes for obtaining soda but more importantly to a new glass formula developed in 1864 by William Leighton in West Virginia. Although commonly called "lime" or "lime flint" glass, this glass was essentially a new composition of soda glass (McKearin and McKearin 1948: 8) which produced a colourless glass with a brilliance approaching lead glass and with excellent qualities for press moulding. It was considerably cheaper than lead glass and became the dominant type of glass for inexpensive pressed table glass in North America (Douglas and Frank 1972: 40).

By the late-19th century, soda had ecome the major type of flux used in the production of glass containers and pressed tablewares. With the introduction of automatic glass-bottle-blowing machines, the use of soda in combination with lime resulted in a hard, stable glass which set up quickly and could accommodate the speed with which the bottles were produced. Today, colourless bottles are still made of soda-lime glass (Dominion Glass Company Limited, ca. 1970: 3).

Potash-Lime Glass

The potash-lime glass industry was until the 19th century essentially a "forest" industry. Glassmakers in western and central Europe, where soda was not readily available, made use of bracken fern and other woodland plant ashes beginning in the 10th century. These wood ashes, high in potash content, were a good and available source of alkali as the forests were so extensive and the ashes were obtained as a by-product of the glassmakers' wood-burning furnaces (Douglas and Frank 1972: 6).

The early potash-lime glasses were usually a green colour due to iron being present in the sand. In Germany and Bohemia this glass was called *Waldglas* and common products included drinking glasses and window glass (Zerwick 1980: 53).

In the 17th century much emphasis was placed on the development of colourless glass formulae. This was in part due to the difficulty in obtaining adequate supplies of soda for making *cristallo*, but as well there was a gradual shift in taste, particularly in Bohemia, towards heavier glasses which would lend themselves to engraving. Bohemian craftsmen were skilled in engraving natural rock crystal and by the end of the 16th century they were engraving some glass (Douglas and Frank 1972: 18). By 1680 a colourless glass made of potash and lime was developed in Bohemia. This "crystal" could be blown into thick, heavy forms and lent itself well to engraving and cutting (Douglas and Frank 1972: 26). Although Bohemian "crystal" was widely exported, table glass imitative of it was made in western Europe throughout the 18th century (McNally 1979: 10). During the 19th century this type of glass became less popular than potash-lead glass but it continued to be made, most particularly into luxury tablewares in Bohemia.

In general, potash-lime glass declined in use during the 19th century due to the switch to coal-burning furnaces and the new processes for obtaining soda. With the advent of machine-made glassware, potash-lime glass was found to be not as suitable as soda-lime glass as it did not set up as quickly.

Potash-Lead Glass

Potash-lead glass, or lead glass, was first developed in England in 1676 by George Ravenscroft. This glass is colourless, heavy, and lustrous, with a high refractive index. It also sets up more slowly than soda-lime glass and, although it was first made into Venetian styles, new styles of glassware which took advantage of all of these qualities were soon fashioned. Stemware was characterized by

solid bowl bases, straight, knopped, or baluster stems, often with air inclusions, and, perhaps most importantly, cut and to a lesser extent engraved decoration (Zerwick 1980: 58-60).

By the second half of the 18th century lead glass was being made in abundance in English and Irish glass factories. The secret of its formula and manufacture was slow to spread to the Continent, however. Although a demi-lead glass was being made in the Low Countries by mid-century (McNally 1979: 41), it was only by 1780 that "the manufacture of English lead-crystal had become more or less commonplace on the Continent" (Charleston 1959: 159).

Although chiefly used in the production of mouth-blown table glass, lead glass was also used for making containers, in particular medicine vials (Noël Hume 1969: 43) and small condiment bottles, and also lamp chimneys (Douglas and Frank 1972: 40). In the United States lead glass was used in the manufacture of pressed glassware but was later replaced by the new soda-lime glass developed by Leighton in the 1860s (Douglas and Frank 1972: 39-40). Today lead glass is still made in great quantities and is the preferred glass for fine tableware and cut glassware.

Presence of lead in glass may be determined by the use of a short-wave ultraviolet light. The characteristic fluorescence is ice-blue. This should be a comparative test as there are other fluorescences, such as mauve for 18th century demi-lead glass and an ice-purple common in late-19th and early-20th century colourless glass, which may or may not be caused by the presence of lead in the glass.

Fluorescence is a non-quantitative test so the term "lead glass" should be used only if the characteristic ice-blue fluorescence is present or if chemical analysis has been done.

Lime Glass

The glass formula developed by Leighton in the 1860s, and used for bottles and pressed tableware, is commonly known as lime glass, although in reality it is a soda-lime glass. The term "lime glass" is sometimes used, as in this case, to distinguish the fact that lime is used as the stabilizer instead of lead (Peddle 1927: 75; McNally 1979: 9). The term has no bearing on whether soda or potash was used as the flux.

True lime glass has greater amounts of lime than the above types, resulting in a higher or near equal proportion of lime to flux. Soda and/or potash may be present in the glass in smaller amounts. In addition there is an appreciable amount of iron oxide which, as well as giving the glass a dark, greenish colour, may have acted as a flux. This glass is extremely hard and stable and was generally used in the manufacture of bottles (wine, spirits, beer) from the 16th through to the 19th centuries. It is usually called bottle or green glass (Biser ca. 1899: 86). Because of the lime content, this glass has been termed "high lime glass" following the chemical analysis of some 18th century dark green bottle glass (see Costain 1978, 1979). In view of the use of the term "lime glass" to describe glasses with lime as a stabilizer, the term "high lime glass" is preferable for this type of bottle glass, thus avoiding any possible confusion.

COLOUR

Because colour is a universal attribute of glass and is convenient for mending and establishing minimal vessel counts, it has been latched onto by some archaeologists as a classification device. Although classification by colour is simple to do, the end result is of little value for the following reasons: colour does not have a direct relation with glass type (the common green, amber, and brown glass colours can occur in soda, potash, and lime glasses; many lead glasses are coloured); colour is not related to the technology of glass object production (i.e. it has nothing to do with whether the glass is free blown, mould blown, pressed, or machine made); colour is only weakly related to the function of the object (almost all colours can be found in all types of objects, an obvious exception being "black" glass which does not occur in tableware). Given these factors there is little justification for using colour as a means of classification. There is a very broad chronology of popularity of various colours over time; however, that chronology cannot be applied to individual glass objects with any significant level of meaning. An attempt will now be made to explain the complexity of colour in glass and the problems in attributing meaning to it.

Colour in glass is usually produced by the presence of metallic oxides in the batch. The

level of concentration of the oxides, their degree of oxidation or reduction, the thickness of the glass, and the presence of other oxides and impurities in the batch all affect the colour produced. Among the metallic oxides most commonly used to produce and alter the colour of glass are iron, manganese, cobalt, copper, tin, uranium, nickel, silver, and chromium.

Iron is a major element in the colour of glass. Rather than being introduced by the glassmakers, iron occurs as a common impurity they go to great efforts to avoid. Iron is commonly found in sand deposits, and deposits with very low levels of iron are highly valued for glassmaking. Other sources that can introduce unwanted iron into the glass batch include the clay used for crucibles, some fluxes, and the glassblowers' tools.

Before the last quarter of the 19th century iron impurities played a dominant role in the colour of most commercial containers produced, imported, and used in North America. The glass manufacturer had three basic ways of dealing with iron in the glass batch: he could ignore it and accept whatever colour came out of the crucible; he could attempt to control its oxidation to achieve a lighter colour; or he could add other metallic oxides or agents to either mask or change the colour imparted by iron.

A wide range of colours can be imparted to glass by iron impurities. Low levels of iron in a glass batch produced from an oxidizing environment yield glass in a range of pale yellow shades (Rosenhain 1908: 196); under conditions of reduction a range of light green tints is produced (Weyl 1959: 119). With higher levels of iron present and melting in an oxidizing furnace, the resulting glass will be brown like modern beer bottles (Weyl 1959: 116). Large amounts of iron and manganese in the batch produce "black" glass such as that used for wine bottles (Biser ca. 1899: 118). Glass with a small amount of iron in the batch can be made colourless by adding a small amount of manganese, "the great decolourizer," which helps oxidize the iron and provides a light purple tint to counter the green tint caused by the iron (Rosenhain 1908: 192-93). However, with time glass decoloured with manganese gains a light purple tint due to ultraviolet rays from the sun (Biser ca. 1899: 43). Iron impurities are common to all types of glasses. The wide range of colours (pale yellow, to light green, to amber brown, to "black") covers the most common colours for commercial containers before the 20th century.

From this discussion it can be seen that to base a classification on colour produces a typology that is wound around a very common impurity in glass. Most archaeological institutions are poorly qualified in terms of technological knowledge and analytical facilities to establish the relationship of the various types of glass with the colour they happen to have. Given these limitations it is recommended that minimal time be spent in describing glass colour, using means such as the Munsell colour charts.

Beyond the commonly occurring colours imparted by iron impurities, the glass manufacturer can create a range of colours using other metallic oxides. Common ones are cobalt for blue glass, copper for green glass, nickel for green glass, and manganese for purple glass. In addition to coloured glass, large amounts of colourless glass have been and are still being produced both for tableware and containers.

Attention will now be focussed on some of the more common non-iron colours in glass which occur on Parks Canada sites.

Colourless — This term is used to describe glass with no colour and is preferable to terms like "clear," "white," "flint," or "crystal," which have not been used consistently by contemporary authors or in historical documents. The production of colourless glass has been a goal of glass manufacturers since early times. Colourless glass requires silica (sand) almost free of iron and a flux and a stabilizer without noticeable impurities. Colourless soda-lime, potash-lime, and potash-lead glasses have all been manufactured in the past, and, except for potash-lime glass, continue to be made today.

Solarized — "Sun coloured amethyst." This type of glass is colourless when produced. Manganese, called the glassmakers' soap, was used to overcome the light green or yellow tint of iron oxide in the batch. However, the resultant glass turns a slight purplish tint after prolonged exposure to the ultraviolet rays of the sun. This type of glass was most common from the last quarter of the 19th century until World War I, but it does occur earlier, especially in 18th century French crizzled glasses.

Blue — Cobalt is one of the strongest colourants available to glass manufacturers. The rich blue it produces was used particularly in the late-18th and 19th centuries for table glass such as salt dishes and decanters, and for medicine and cosmetic containers.

Copper green — Imparted by the presence of copper oxide, this colour is commonly used for modern wine bottles and some large-size pop bottles. It should not be confused with the more common shades of light green produced by iron.

Purple — Manganese dioxide was used more often for decolourizing glass than for imparting colour. However, when used in slightly stronger concentrations it can produce several shades of purple, including a simulated black glass. It was used for pictorial flasks and some tableware.

Opaque white — Opaque white glass (popularly known as milk glass) was used both for tableware and commercial containers. It can be produced by using tin oxide or bat guano which is high in calcium (Biser ca. 1899: 105-6), but there are other opacifiers available as well (see Charleston 1954). Opaque white glass was redeveloped by the Venetians in the early-16th century (Polak 1975: 58) and has continued in production since that time. In the late-19th century it became more widely used for tablewares, containers, and lighting devices.

Black glass — "Black glass" is a term frequently used in the literature to refer to dark green glass liquor bottles of the 17th, 18th, and 19th centuries. "Black glass" can be almost opaque and developed out of the switch from wood to coal as a fuel for glass furnaces in England. "Black glass" has high levels of iron, manganese, carbon, and sometimes cobalt. During the pre-1820 period, bottles made of "black glass" were the dominant type of containers used in the liquor and mineral water trades. True black glass is extremely difficult to obtain and most black objects, such as beads, are, in fact, a dense purple colour.

The simplicity of the above discussion is deceiving. Rarely is the issue of colour simply the presence of one oxide. Once again it needs to be stressed that classification of glassware by colour does not identify the type of glass but simply the oxide present. These oxides and colours blend into each other and form continuums. Classifications by such elusive traits will be very arbitrary and of doubtful value.

In describing glass the following list of colours and modifiers should cover about 98% of glass artifacts from excavations.

Light — Used as a synonym for pale.

Dark — Used to describe intense colour in glass.

Opaque — Used to describe glass that transmits light but does not allow one to see actual objects through it. Used to describe milk glass, black glass, and other colours of glassware with the same quality. Genuinely opaque glass, i.e. glass that does not transmit light, is extremely rare. This term is not to be used to describe heavily patinated glass.

Iridescent — Used to describe glass that has been deliberately manufactured with an iridescent surface, such as "carnival glass." This term should not be used to describe patination.

Marbled glass — Popularly called "slag" glass. Two different colours of glass have been streaked together to resemble marble. It was particularly popular in the late-19th century for pressed glass novelty items and for decorative window glass.

Common colours found in glass that can be modified by the above terms include colourless, green, blue-green, blue, purple, amber, white, red, pink, and black.

CONDITION

The condition of glass recovered from excavations can be the result of the manufacturing of the object, use of the object, or exposure to the post-discard environment. Most conditions of the glass have low potential for use in establishing chronologies, or the identification of object function or social status. Unless some research objective can be

answered by the condition of the glass, it is suggested that time and effort in describing be minimized.

Most glass recovered from excavations is in the form of sherds. When cataloguing or inventorying it is helpful to record the diagnostic parts present such as necks, bases, stems, rims, handles, finials, etc. In addition, it is useful to know which objects are restorable to the extent that a complete profile could be drawn. Complete objects should also be indicated in the inventory or catalogue.

Internal Features

Except in unusual circumstances it is unnecessary to describe or even discuss the following problems. However these flaws may be useful in finding fragments of the same vessel when mending.

Bubble — A gas-filled cavity within glass (BSI 1962: No. 7101). The number or size of bubbles has absolutely no connection with the age of the glass. "Seed bubble" is an extremely small bubble. "Blister" is a relatively large bubble.

Inclusions — Either "glassy" or "non-glassy" inclusions of composition different from that of the surrounding glass. In dark green glass bottles it often resembles green scum. This condition of glass should not be confused with deliberate inclusions used as decoration.

Devitrification — Development of crystallinity in glass with progressive loss of transparency (BSI 1962: No. 7209).

Internal fractures — A network of internal fractures that do not extend to the surface. On archaeological specimens this condition is often found on glass that has been exposed to heat. This should not be confused with external fractures which have been produced for decorative reasons (see Crackle glass).

Surface Features

Orange peel — Surface irregularity of glass resembling the surface of an orange (BSI 1962: No. 7306). Often found on bottles blown in a full-sized mould.

Whittle-marks — A glass bottle collectors' term that describes a rippled or ruffled surface that results from blowing the glass into a metal mould that has not reached a heat comparable with the glass (Toulouse 1969b: 525-26). This effect can occur on machine-made bottles. Apsley Pellatt (1849) has the following to say on the subject:

> All bottle moulds, while working, require to be kept nearly at a red-heat, by means either of a small furnace, or a piece of hot Glass, which is held by a lad inside the mould upon a punty-iron, during the intervals it may be unoccupied by the two blowers. Without this precaution, the surface of the bottles will be *ruffled* (Pellatt 1968: 104).

Striations — Grooves or lines, generally on bottle necks, which seem to be caused by the manufacturing process. They are often spiralled slightly.

Patination — Layered crust that is produced by decomposition of the glass (weathering) and is quite distinct from the unaffected glass itself. Patination should be regarded as a natural process of decomposition of glass buried in the ground or in water and except for unusual circumstances no particular notice should be taken of it. The presence of patination (or its absence) is no guarantee of age. Some glass is more prone to decomposition and some environments tend to accelerate the process. In slightly different burial locations different parts of the same bottle may be affected quite differently.

Bloom — A haze or film that forms on glass as a result of atmospheric action.

Pitting — Used to describe glass that has deep depressed scars on the surface. It is often found on glass that has been exposed to heat.

Crizzling — An important form of devitrification, often associated with certain types of mid-18th century French tableware (McNally 1979: 33-34). The surface of the glass has a fine network of crazing which reduces the transparency of the glass. It is caused by an unstable glass composition where the calcium concentration is too low

and/or the alkali content is too high. The glass is attacked by moisture in the atmosphere, causing leaching of the alkali, and when the glass is dehydrated the surface begins to deteriorate. The problem may affect the entire object but begins on the surface. The surface of the glass often has a dry scaly feel. The condition is often accompanied by solarization.

Stability – Chemical durability, resistance to weathering.

Solarization – Changing of glass colour through exposure to ultraviolet rays.

Use-marks – Unusual wear or abrasion on the surface of an object should be noted.

Affected by fire – A general term used to describe a glass object that has been in contact with sufficient heat to cause some chemical or physical alteration.

Water-worn – Glass that has been exposed to the action of water, or water and sand, becomes cloudy and the edges of the glass tend to become rounded, rather like pebbles on a beach.

COMMERCIAL MARKS

Many glass containers and stoppers have commercial markings including the following types: trademarks, tradenames, contents, instructions for use or dosage, patent dates, etc. Trademarks or tradenames can be from the glass manufacturer, a bottler, a distributer, or even a small pharmacy. Sometimes the container or vessel shape itself serves the same function as a commercial mark. This is particularly true for early patent medicines. On tableware and lighting devices the commercial marks are usually those of the manufacturer. These types of markings are among the most useful tools available for establishing chronological information for archaeological contexts and, even more importantly, the identification of products consumed by the site's occupants. The following references are very useful in identifying trade and other commercial marks: Baldwin 1973; Chopping 1978; Morris 1978; Petersen 1968; Toulouse 1971; Urquhart 1976; Wilson and Wilson 1971.

The commonest methods of marking are described below:

Embossed – Raised letters and symbols created on the glass through use of full-size moulds, either blown, pressed, or machine-made (see Fig. 30). This was the most common form of commercial marking on containers and tableware in the 18th and 19th centuries.

Paper label – A paper label can be attached to various parts of a container or other form of glassware. Paper labels were very common from the second half of the 19th century onwards.

Applied colour label (ACL) – Baked-on enamel colours. The label becomes an integral part of the glass. As a commercial label it is found primarily on soft drink bottles. Commercial use of ACLs began in 1934 (Riley 1958: 145).

Acid-etched – Commercial marks are made by etching the glass surface with hydrofluoric acid. These are often found on tableware bases, on druggists' shop furniture, and a light bulb in our collection has acid-etched commercial marks on it.

Gilded – Occasionally objects may be found with gilded markings. The gold is powdered, mixed with an adhesive agent, applied to the container, heated in a muffle, and polished. Gilded commercial marks are generally found on druggists' shop furniture bottles or other display containers.

Engraved – Commercial marks may be carved into the object by means of a copper wheel and an abrasive or a diamond point. Used on druggists' shop furniture bottles, to label decanters and cruets, to mark gradations on cylinders and beakers, or designer signatures (for an example of engraving see Fig. 38a).

Glass labels – Used on druggists' shop furniture bottles. The label is of glass with painted, gilded, or enamelled letters and is cemented onto the bottle. The bottles frequently have a recessed area designed for attaching the label (see Whitall, Tatum & Co., 1896).

Seals – Applied glass blobs on the body or

shoulder of an object are marked by pressing a small metal seal with an intaglio design onto the hot glass. The inscriptions on the seals may apply to individuals, to companies, to kings, or to specific products. Seals were most frequently used on containers, and are more common on bottles dating before 1840.

PERSONALIZED MARKS

Occasionally containers or tableware are found with initials or other marks scratched into the surface of the object. These do not appear to be commercial marks but appear to be marks made by the person or persons who owned or used the item.

MANUFACTURING TECHNIQUES

Identification of the method of manufacture of glassware can provide information on chronology, sometimes on the country of origin, and on differences in cost-status of the objects, particularly for tableware. In addition, a written description of the manufacturing technique can aid the reader in visualizing the object. Certain techniques or methods can be associated with specific types of objects, e.g. optic moulding is usually used in fabricating tableware and, in our collection, tumblers in particular.

The emphasis in this section of the glossary is on containers, because the technique of manufacture of these items tends to be more useful than the same information on other forms of glassware. There are, however, many aspects of manufacture in this section that are usable for other functional types of glassware.

Tableware manufacturing techniques are less easy to utilize for dating than are the manufacturing methods used for producing containers. For one thing, there is continued use of old techniques, and some techniques were in use in this branch of the industry before they were adopted by container manufacturers. There is more concern with an individual item of tableware and often an attempt is made to disguise the method of manufacture, either by a more careful use of moulds, by decoration, or by firepolishing to improve an object's appearance. As well, tableware is an article of fashion, changing in style and shape, and these attributes are more important interpretive tools for tableware than are manufacturing methods. An exception to this generality is an introduction date for a technique, press moulding being the best example.

Mouth-blown Manufacture

Mouth-blown glassware is shaped with air pressure applied through a blowpipe by the mouth. In cataloguing, the term is used as a general one, signifying a non-machine-made or press-moulded container, and is used to describe the method of manufacture of a fragment that has no mould seams, no distinctive mould-blown texture, no distinctive free-blown traits, and no machine-made indicators. An example is 100 fragments of black glass "wine" bottle bodies; another is a "wine" bottle base or finish of the 17th, 18th, or 19th centuries, which was made by hand, but the body of which was formed either with or without a mould.

The steps involved in forming glassware vary according to the object being made. As an example of some of the processes involved in mouth blowing, also called hand manufacture, a general outline of the method of producing a mouth-blown bottle is given below.

1. Using a hollow iron rod, called a blowpipe, a gatherer skims the surface of a pot or tank of molten glass and collects a small quantity on the pipe. He may make a series of gathers until he has the right amount of glass on the blowpipe.
2. The blower rolls the gather of glass on a flat or slightly curved surface called a marver to centre the glass on the blowpipe and to chill it slightly. He may introduce a small amount of air at this point. He may further marver to form rough divisions of bottle parts, body and neck, in the gather.
3. He begins to blow air into the glass and to fashion it into a bottle. To do this he may use a mould of the desired shape, or he may use hand-held tools and natural forces to form it without a mould.

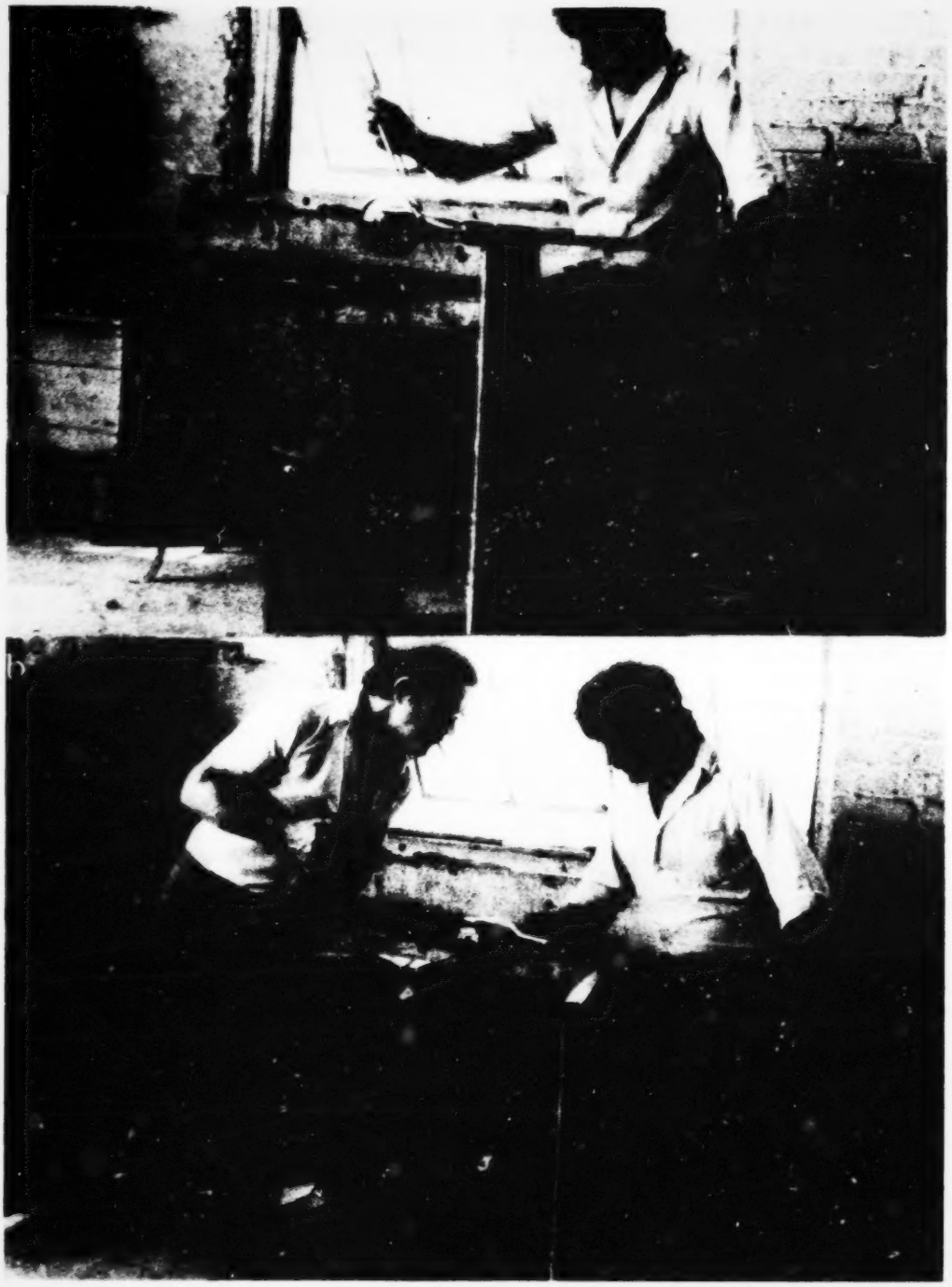


Figure 1a, 1b. Some of the steps involved in the off-hand manufacturing process of a bottle. These photographs were taken at the Chalet Glassworks in Cornwall, Ontario, in May 1972. The glassmakers are using traditional glass-working tools. (a) The neck of the bottle is lengthened by the jacks. (b) Shaping the body with a flat paddle.

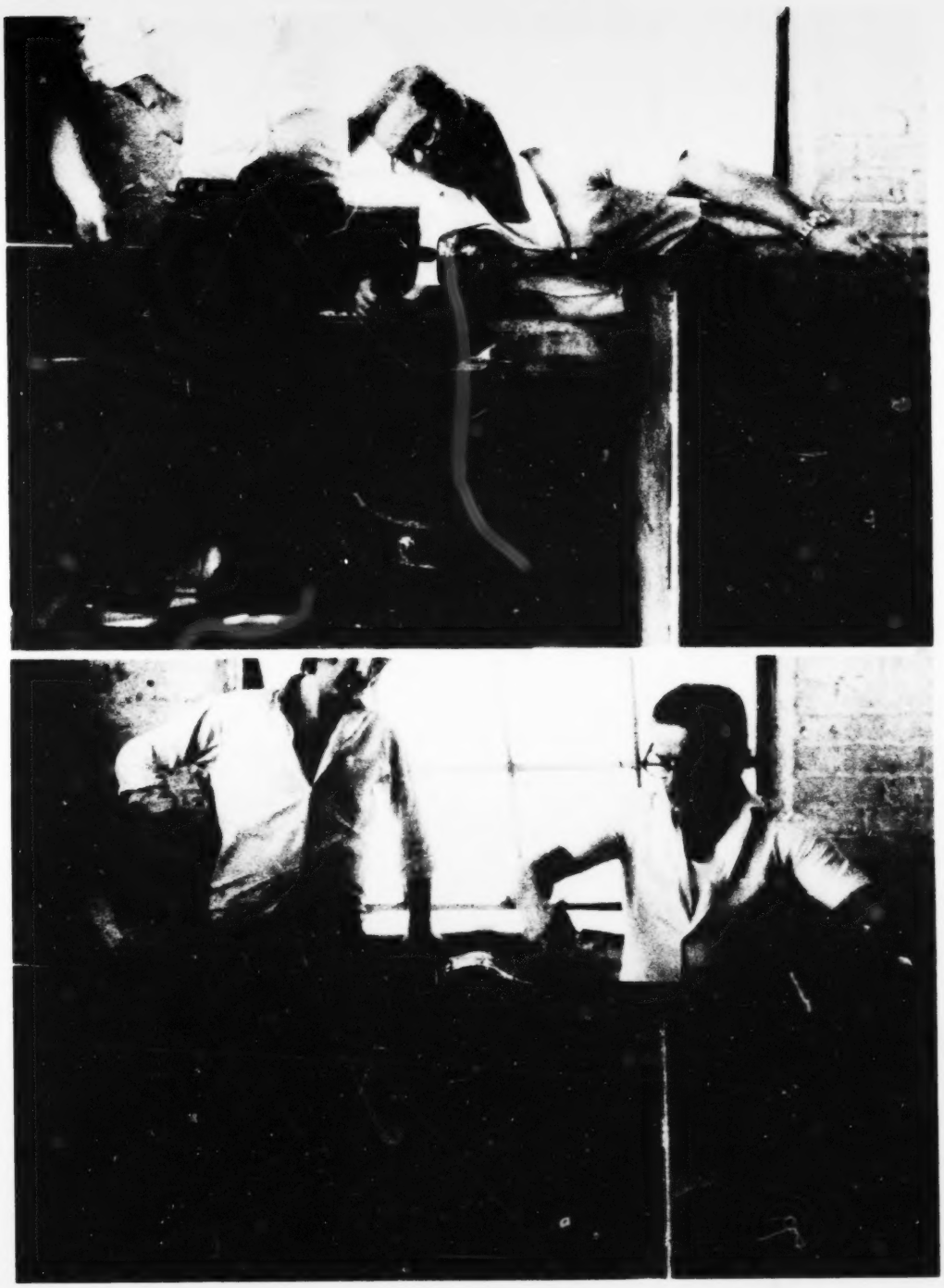


Figure 1c, 1d. (c) The assistant holds the pontil rod as the glassmaker attaches it to the base of the bottle. (d) Detaching the bottle from the blowpipe. Shears are used to set up a stress pattern and the blowpipe is tapped.

Figure 1e, 1f. (e) Hot glass is added to the neck to form the string rim. (f) A completed bottle.

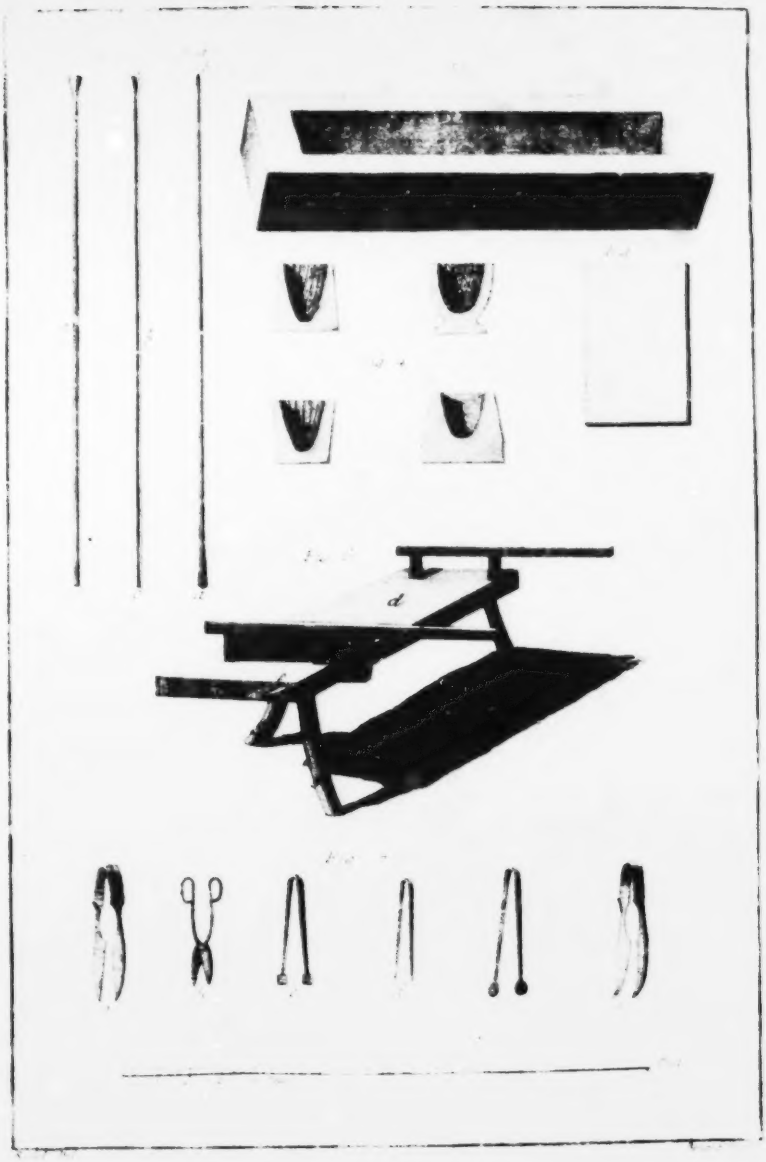


Figure 2. Glassmakers' tools. Plate XVIII from Diderot & d'Alembert (1772).

4. The bottle base may be formed in the body mould, or by hand-held tools after the body is made. A container may be considered complete at this point.
5. An incomplete bottle is attached to an iron rod (pontil) or held in a snap case. The bottle is detached from the blowpipe. The finish is formed from added glass or by manipulating the glass at the end of the neck.
6. The completed bottle is removed from the tool and taken to an annealing oven or lehr.

Recommended readings (best overall illustrations) — Diderot & D'Alembert 1772; Kendrick 1968; Kulasiewicz 1974; McKearin and McKearin 1948; Wilkinson 1968.

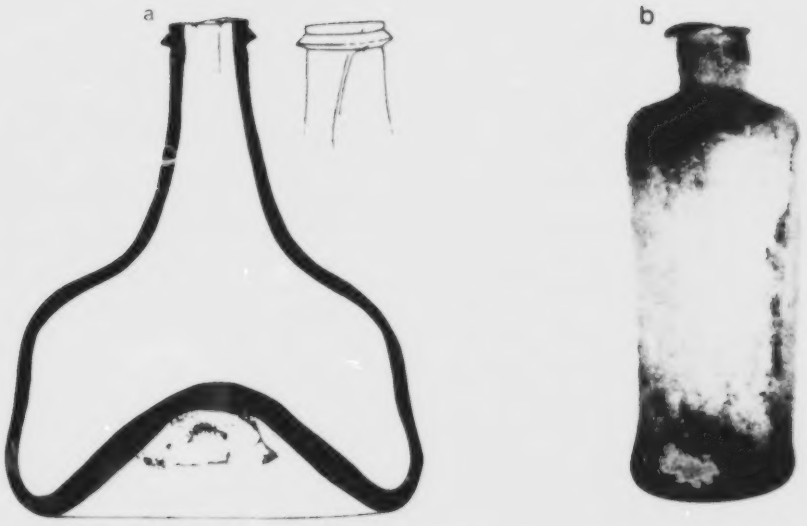


Figure 3. Two examples of free-blown bottles. (a) An English dark green glass "wine" bottle with body sides which flare to the base. (b) A medicine vial.

Free-blown Bottles

Manufacturing technique is usually defined by the effects of manufacture on the main part of the container, i.e. the body. Free-blown bottles have been formed entirely, body, shoulder, and neck, without the use of moulds. The base and finish are usually hand-formed as well.

Characteristics

1. The bottle formed without a mould will generally not be symmetrical in body, shoulder, neck, or base.
2. There are no mould seams, no embossing, no moulded decorations, and the exterior glass surface tends to be smooth and glossy, patinated areas excepted.
3. The lines of the bottle will not be sharp, but will flow.
4. Although free forming of glassware can produce some of the most elaborate shapes, being free from the confining borders of the mould, simple globes and elongated shapes are easiest to form free-hand in quantity, so that free-blown commercial containers are most likely to be these shapes.
5. There is a tendency for the glass to be evenly distributed in the various areas of the bottle.

Dating

Large-scale production and a desire for standardized capacity and specific shapes encouraged the use of moulds for container glass manufacture. English "wine" bottles, for example, started to be mould-blown in the 1730s, but were free-blown before that. Free-blown medicine vials, however, continued to be made into the 19th century. Free-blown containers occur less and less frequently as time progresses, depending on the type of container and the country of manufacture.

Free-blown glassware can have been manufactured any time after the discovery of the blowpipe, ca. 1st century B.C., to the present. Therefore, as a general rule, one is unable to state a date of manufacture based on the fact that the object is free-blown.

Moulded Glassware

Glass objects whose shape or decoration is determined by moulds are called "moulded

Figure 4. Interior view of a glass factory (from *Knights American Mechanical Dictionary*, Vol. II, 1876, plate xx facing page 976).

glassware." Hot glass is forced to the outer extremities of the inside of the mould, either by air pressure from mouth or machine, or by pressure exerted by a plunger.

CONTACT MOULDING

Contact moulding is forming a full-sized object or portion of an object in a mould of any number of pieces, using air pressure supplied either by mouth or machine.

Hot glass is introduced into a contact mould which may or may not have a design or pattern. The glass is expanded by air pressure until it fills the mould; the object or partial object is removed. It may be considered complete at this point, or may be completed after removal from the mould.

Mould-blown, in cataloguing, is used to indicate that the specific type of contact mould used to form the glass object cannot be identified. If distinctive marks on the object identify either the type of mould used or that the item was machine-made, that information is more diagnostic and therefore should be noted. Otherwise fragments displaying general mould-blown features, like a mould seam, an embossed letter, moulded decoration, etc., are catalogued under the general manufacturing technique "mould-blown."

Usage

Generally, mould-blown commercial containers have been formed in a full-sized or contact mould of a specific type. The number and location of pieces that made up the mould can be diagnostic. When the type of contact mould cannot be identified, the term "mould-blown" is used to describe the container's manufacture. Occasionally certain containers, such as small decorated flasks, were formed

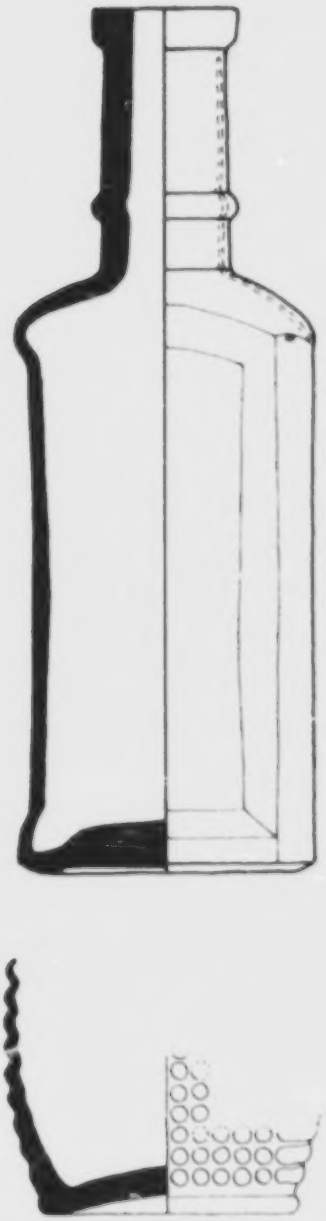


Figure 5. Examples of contact-moulded glassware. Note that the interior and exterior surfaces of the glass are parallel to each other.

using techniques other than contact moulds, e.g. a pattern or a press mould. Unless one of these types of mould is specified, the assumption is that "mould-blown" containers have been contact moulded.

Tableware, on the other hand can be made using several techniques, and more than one method can have been used on the same object. The specific type of contact mould, if one was used, is not as diagnostic in the case of tableware as it is with containers. For tableware items, therefore, "contact moulding" is the manufacturing method and generally the number of mould parts is unimportant. The term is used to distinguish this manufacturing method from pattern moulding, optic moulding, press moulding, and free-blown. Example: pattern-moulded bowl, contact-moulded stem, applied foot.

Characteristics

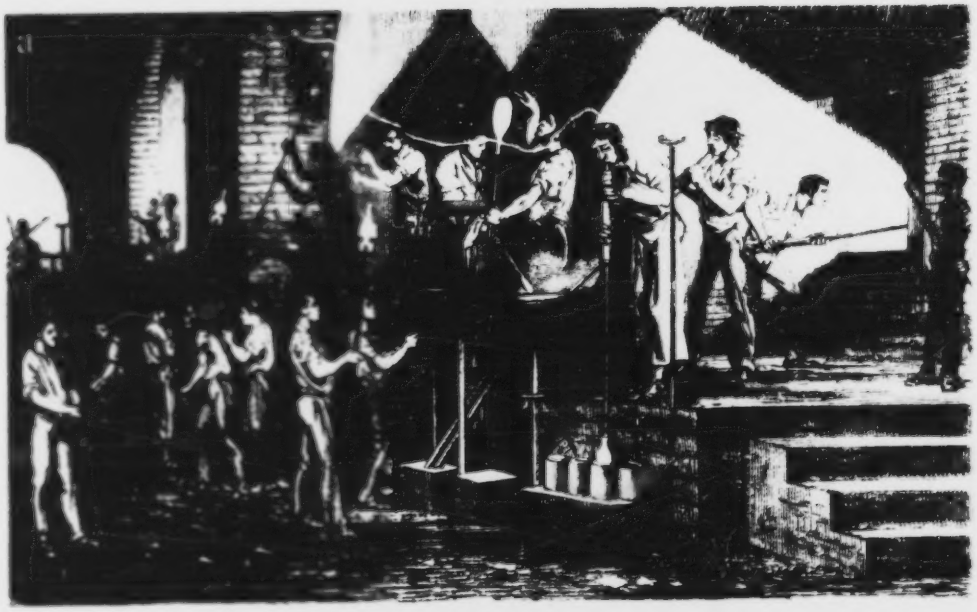
1. The shape of the object or partial object formed in the mould is deliberate.
2. The pattern, if there is one, has been determined by the mould and is even, i.e. it does not expand or become diffuse as in pattern moulding.
3. In cross section the inner and outer surfaces of the glass are parallel to each other; the interior pattern follows the pattern or embossing.
4. There may be mould seams left by the mould.

Dating

This moulding technique dates back to Roman times and was used extensively for commercial containers during the Roman period. It was reintroduced during the Venetian period, and throughout the 17th century for forming stems on stemware, but does not appear to have been used much for containers. Possible exceptions are the square dark green glass case bottles which appear in 17th century contexts in North America and in Dutch paintings. Contact moulding, both dip moulds and open-and-shut moulds, became more frequently used during the 18th century. The blow moulds of machine manufacture are technically contact moulds (see Machine-made Glass Containers).

Dip-moulded Body

The parison of hot glass on the blowpipe is dipped in through the top of a mould. Then the parison is blown to the confinement of the



b

Figure 6. (a) One glassmaker is blowing hot glass into one of a bank of dip moulds (Peligot 1877: Fig. 47). (b) A selection of French blue-green bubbled glass bottles made by the dip-moulded process. These examples show the use of similar body moulds with differing neck styles.

mould. This gives the body and sometimes the base its shape. The shoulder and neck of the vessel are free-formed. After the bottle is blown to full size, it is pulled or lifted through the top of the mould by the still-attached blowpipe. Generally the tops of dip moulds are a little bit wider than the base to facilitate the removal of the full-blown bottle. Although dip moulds are often described as being one piece, those made for square bottles may actually consist of four boards nailed together to form an open-topped box. Whatever its construction, the dip mould does not open to remove the object; rather the object is taken out of the mould through its open top.

Characteristics

1. There are no actual mould seams on the bottle, even on square or rectangular shapes, although there may be a bulge at the body-shoulder junction. This is caused by overblowing the glass which begins to expand over the top of the mould.
2. The body shape must be straight up and down or tapered towards the base; it cannot taper towards the shoulder. Dip-moulded bottles occur in square, cylindrical, octagonal, and rectangular varieties on our sites.
3. Body symmetry should be assured, although the shoulder height may vary. Subsequent activity during the forming process may also cause irregularities of the body, like basal sag on English "wine" bottles.
4. The glass surface in the body may be textured from contact with the mould; the shoulder and neck should be smooth and glossy. Eighteenth-century French "wine" bottles do not often exhibit this characteristic, possibly because they were marvered after removal from the mould.
5. Embossed lettering and horizontal designs should not appear on the body, shoulder, or neck, although a vertical design on the body (e.g. ribs) is possible. If a base part is included as part of the mould, it may have embossing, letters, or decoration on it (Harris 1979: 126, Fig. 6).

Dating

The beginning date is uncertain; the technique was certainly in use before the 18th century.

The introduction of dip moulding for the manufacture of English dark green glass "wine" bottles is probably the late 1730s. The use of the mould in France is probably earlier than in England, and dip moulds were still being used in France in 1870 (Peligot 1877: 8). In the United States the mould type declined in use during the second half of the 19th century, and the British probably followed a similar timetable.

As a general rule this technique is not useful for dating.

Two-piece Mould

The base, body, shoulder, and neck of the bottle are formed together in a two-piece bottle mould which is hinged either at the bottom or at the side. The finish is formed by hand tooling.

Characteristics

1. Mould seams extend from below the finish, down the neck and side of the bottle, across the base, and up the other side of the bottle to below the finish. The body seams are often concealed in two corners of a flat-sided bottle, diagonal to each other.
2. The basal mould seam may go across the base in a straight line, or the base may be keyed, i.e. the mould seam crosses the base, half circles the pushup area, and continues across the base.
3. There is sometimes a horizontal bulge or line around the base of the finish as a result of glass being blown beyond the top of the mould.
4. The bottle should be symmetrical on the exterior. Glass distribution inside the bottle is often uneven.
5. There may be embossed letters and symbols on the body.
6. The glass may have the textured surface typical of moulded bottles.
7. Two-piece bottle moulds were commonly used to make decorated flasks, round-bottomed and torpedo soft drink bottles,

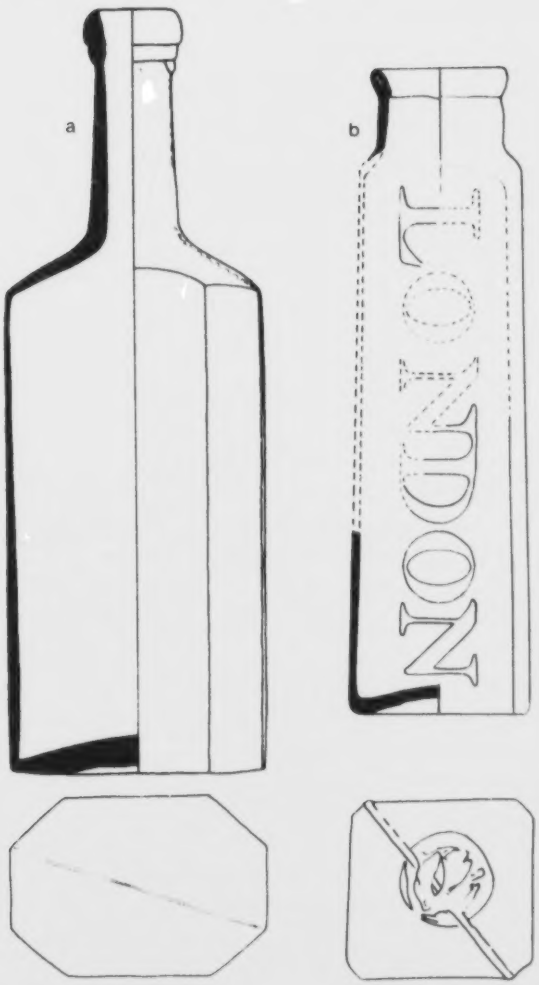


Figure 7. Two examples of two-piece moulded bottles. (a) A probable sauce bottle. (b) A London mustard bottle. In both cases the mould seam crosses the base and is concealed in the corners of the flat-sided body.

and small proprietary medicine and flat-sided bottles.

Dating

The earliest known example of a bottle from this kind of mould is a Turlington's Balsalm of Life, embossed with the date "1750" (Noël Hume 1969: 43). Pellatt has

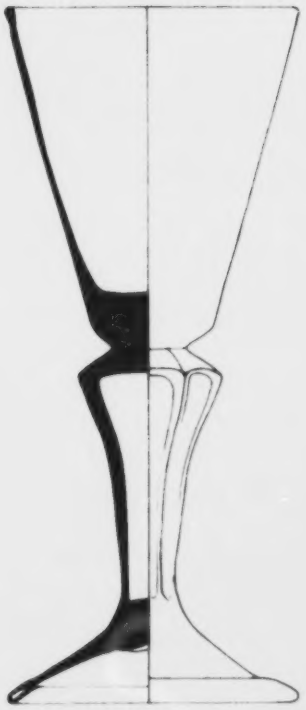


Figure 8. The stem of this drinking glass has been mould blown and attached to a free-formed foot and bowl. The mould seam stops below the bowl and at the foot-stem junction.

such a mould in common use in 1849 for flat-sided bottles in England, a Ricketts-type mould being preferred for round bottles (Pellatt 1968: 103). Toulouse has this mould type in common use in the United States from 1810 to 1880 (Toulouse 1969b: 535).

Evidence from archaeological sites certainly shows this type of mould being used for small bottles such as Turlington's and Essence of Peppermint before the end of the 18th century. The mould becomes increasingly infrequently used during the last third of the 19th century. It appears to be replaced by the two-piece body mould with third base part. General dating of two-piece mould-blown containers is ca. 1750 to ca. 1880.

Similar mould constructions were used in tableware manufacture. Small embossed tumblers (as well as highly decorated coloured vials) with a mould line crossing the base are found in French contexts of the mid-18th

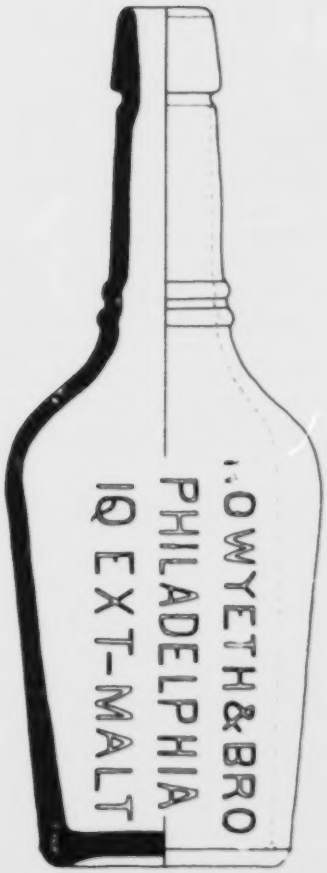


Figure 9. A probable bitters bottle blown in a two-piece mould with a separate base part that leaves a mould seam above the heel of the bottle.

century (McNally 1979: 37). These are popularly attributed to the French inventor Perrot in the late-17th century (Barrelet 1953: 96, Pl. XLI, C). The technique of using a full-sized hinged mould, no matter of how many pieces, was in use in the tableware industry long before it was used in the container branch to make complete objects or parts of objects. For example, from the late-16th century onwards certain styles of stemware had stems blown in two-piece contact moulds (Noël Hume 1963: 68); the bowl and foot were then added to the pre-formed stem, so that the mould lines appear on only the hollow-blown stem portion. The *bouton carré* (silesian stems) found in mid-18th century contexts have been formed in this way (McNally 1979: 35).

Two-, Three-, or Four-piece Vertical Body Mould with Separate Base Part

The mould consists of a two- or more-piece, side-hinged mould and a separate base part, either a post or a cup. This type of mould can be used to form all parts of the object, although the finish or rim is usually hand-shaped.

Characteristics

1. Mould seams begin at the edge of the base part on each side of the bottle and extend up the bottle as high as the finish.
2. Base mould seams are typical post or cup bottom seams (see those sections for explanation).
3. The bottle should be perfectly symmetrical on the exterior.
4. There may be embossed letters, symbols, and decorative techniques on the body and on the base.
5. The glass may have the textured surface typical of moulded bottles.

Dating

The two-part vertical body mould with separate base part becomes the most common container mould type for the late-19th and early-20th centuries. Archaeological evidence points to a beginning date after the mid-19th century. This mould type largely replaces the two-piece mould, the dip-mould, and the Ricketts-type, although there is a prolonged lag time. Bottles with characteristic two-piece mould, separate base part manufacture should probably be dated between ca. 1850 and machine manufacture, mid-1920s.

The three- and four-part vertical body moulds with separate base part were used primarily for oddly shaped or highly decorated containers; containers made in these kinds of moulds are not common.

The tableware industry was using a multi-part vertical body mould with separate base part at an earlier period than the container industry. The so-called "blown three mould" highly decorated vessels produced in the United States and in Great Britain appear to have been blown in this type of mould construction (McKearin and McKearin 1948: 244).

These objects are usually dated to the first half of the 19th century.

Shoulder-height Multi-piece Moulds with Free-blown Shoulders
(Toulouse 1969b: 532)

Characteristics

1. There will be mould seams on the body, disappearing at the shoulder.
2. There should be a bulge at the body-shoulder junction, as on dip-moulded bottles.
3. There may be embossing on the body, but never on the shoulder.
4. The body will be symmetrical, but the shoulder may not be.
5. The surface of the body may be textured from contact with the mould; the shoulder and neck surfaces should be smooth and glossy.
6. The body shape is not limited as in a dip mould; it can be any shape whatsoever.

Containers of this method of manufacture are uncommon on our sites and would be considered unusual.

Ricketts and Ricketts-type Moulds ("Three-piece Mould")

This is a three-part mould consisting of a dip mould for shaping the body and two matching shoulder or shoulder-neck shaping halves. There may be a fourth part, for forming the base, or the base can be formed after the bottle is removed from the mould. The container is hand-finished, often with a finishing tool.

Characteristics

1. The body, shoulder, and possibly the neck glass surfaces should be textured from mould contact.
2. Mould seams are situated as follows: there is a horizontal mould seam at the body-shoulder junction and two vertical mould seams over the shoulder, on opposite sides of the shoulder. These may extend part way up the neck.

Figure 10. A Ricketts-type moulded liquor bottle, showing the characteristic mould lines on the shoulder.

3. There may be moulded lettering formed in the shoulder portion of the mould; moulded lettering never appears on the body, although the same vertically oriented designs on the body are possible as may appear on the dip-moulded body.
4. The body portion of the bottle must be tapered, even slightly, for removal from the dip-mould portion.
5. The base, if formed in the mould, may have moulded lettering, and the base part will have left a mould seam.
6. There may be vent marks on the bottle, usually on the shoulder, sometimes concealed in the seams.

7. This type of mould was particularly popular for the manufacture of "wine" and liquor bottles, as well as other cylindrical bottles, like pharmaceuticals.

Dating

A patent was granted to Henry Ricketts in 1821 for his three-part bottle mould which featured a fourth mould part, i.e. a base-moulding section (Great Britain Patent Office 1857). This base plate was operated by foot levers and could be moved up and down to make bottles of various sizes and capacities which were also symmetrical.

English and American glasshouses used moulds of this type, although they were not necessarily Ricketts' patented moulds. By mid-19th century a three-piece mould was preferred to a two-piece body mould for round pharmaceutical and toiletry bottles because it did not leave obvious, unsightly mould seams on the body (Pellatt 1968: 103).

Some French factories were using Carillon (or Carillion's) three-piece mould for the manufacture of some kinds of bottles by the 1860s. This three-piece mould had vent holes in the base and produced a bottle weighing 750 g, with a capacity of 70 cL (Peligot 1877: 304).

There is a suggestion in the literature (Noël Hume 1961: 105) that the "three-piece mould" predates 1821, but no proof of this has been found. Research on dated "wine" bottles indicates that Ricketts was producing bottles in the patented mould by 1822 (Jones 1983).

Observation of material from our sites suggests that the Ricketts-type mould was used almost exclusively for dark green glass liquor bottles between ca. 1821 and ca. 1840. In the 1840s the mould began to be used for other kinds of bottles, such as pharmaceuticals. By the late-19th century, use of the Ricketts-type mould by the liquor trade had virtually disappeared, although it continued to be used on pharmaceuticals, toiletries, inks, etc. A general date for this mould type is 1820s to 1920s.

Turn- or Paste-moulded Bottles

Moulds for this process are symmetrical along their vertical axis. The inside surface of a mould is coated with a durable paste that absorbs water. This surface is wetted before using the mould. While the parison is being blown in the mould it is rotated on the blowpipe and rides on a thin cushion of steam which eliminates all mould lines.

Figure 11. A probable champagne bottle manufactured by turn moulding. Note the symmetry throughout the bottle parts.

Characteristics

1. The bottle must be circular in horizontal cross section; the vertical shape can vary.
2. There will not be any embossing on the bottle, nor will there be mould seams, except possibly in the basal area or on the base.
3. The glass surface should exhibit a high polish, not the texture common to mould-blown bottles.

4. There may be faint horizontal lines on the exterior surface of the glass from contact with grit on the lining of the mould.
5. The bottle will be very symmetrical throughout.

Dating

Turn-mould technology may have been used on tableware and apothecary ground glass stoppered bottles before it was introduced in the making of common commercial containers. When and where the technique developed is not clear; however there were turn-paste-moulded bottles containing French champagne recovered from the wreck of the steamship *Bertrand* which sank in the spring of 1865 (Switzer 1974: 23-25). Turn moulding also appears to have been in use in Germany and, according to Toulouse, was one of the sources of this technique being introduced into the United States in the 1880s (Toulouse 1969b: 532). During the 1870s and 1880s several patents were taken out in the United States for seamless bottles, i.e. turn-paste-moulded bottles (Toulouse 1969b: 532). Bottle types commonly made by paste-mould production include champagnes, hock wine, brandies, claret, and other liquor bottles. These bottles seem to be most common from the 1870s through World War I (Toulouse 1969b: 532). By 1900, C.A. Tatum of Whitall, Tatum & Co. writes that:

> The seamless bottles are now made very generally in factories, and the Foreign article, which was formerly staple, is now almost entirely replaced by the domestic make (Tatum 1900: 20329).

In spite of this assertion, a hotel, bar, and restaurant supply catalogue from New York city published in 1913 listed all of its seamless bottles as imported (Budde and Westermann 1913: 148-50). General dating for this technique of moulding bottles is 1870s to the 1920s.

Turn moulding was commonly used in the manufacture of lamp chimneys and tumblers in the 19th century, and was also used for producing light bulbs beginning in 1879 at the Corning Glass Works (Douglas and Frank 1972: 45). The turn-mould process is still used for some machine-made items such as tumblers, light bulbs, etc.

PATTERN MOULDING

Pattern moulding is a method of blowing mould-decorated glassware and yet avoiding the limitations on shape imposed by a mould. The hot gather is introduced into a part-sized mould with a simple recurring design, like diamonds, ribs, stars, etc. This mould may be made of one or more parts, depending on the decoration. If a dip mould is used, the pattern is always vertical, like ribs, but the object

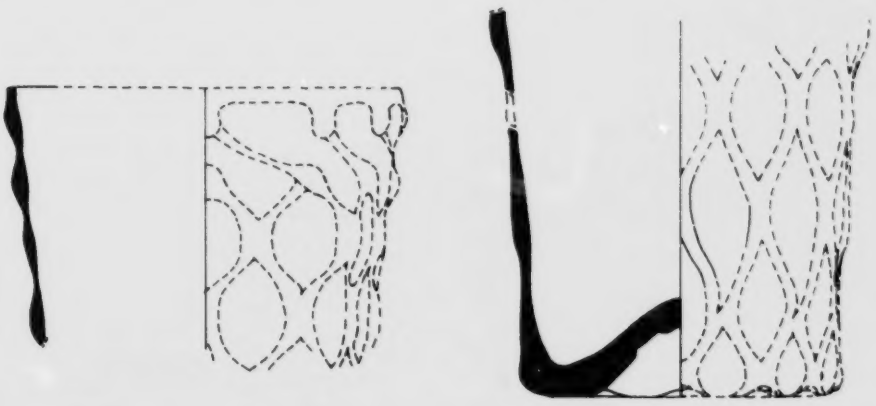


Figure 12. This tumbler has been manufactured by pattern moulding. The diamonds are more concentrated at the bottom of the object and diffused at the top, and the interior and exterior glass surfaces have corresponding contours (cf. contact-moulded examples, Fig. 5).

may be given a swirling design by simply twisting the gather. The parison can be dipped into the mould in such a way as to cover the whole glass surface area, or just a portion of it. The gather is expanded by mouth blowing to fill the mould; the decorated parison is removed and then free-blown to its final shape, and hand-finished.

Characteristics

1. The pattern from the part-sized mould will tend to be more diffuse in the thinly blown areas of a vessel, like the shoulder of a bottle or the rim of an object; it will tend to remain distinct in the less thinly blown areas like the base of a tumbler.
2. Whereas contact moulding creates a concave-convex relationship between the inner and outer surfaces of the glass, pattern-moulded objects have corresponding contours on the inner and outer surfaces, i.e. a ridge on the outside has a corresponding ridge on the inside.
3. Any mould seams left by the part-sized mould will be diffused in the same way as the pattern, and may be impossible to identify.
4. The object, having been free-blown, may exhibit characteristics of free-blown manufacture, like lack of symmetry, freedom of form, glossy glass surface, etc.
5. Containers manufactured by pattern moulding which appear on our sites are usually flasks; pattern-moulded tumblers and stemware bowls are also common.

Dating

This is probably one of the few moulding techniques to have continued in use from Roman times, at least in Europe. Pattern-moulded glassware was being made in England, if not before then certainly after the arrival of the French and Venetian glassmakers in the 1570s. The technique appears in the American-made glass products of William Stiegel, who manufactured glass between 1765 and 1774 (McKearin and Wilson 1978: 322). This method of blowing decorated glassware is still in use in places where mouth blowing of glassware continues. The technique is not one that can be translated into machine manufacture.

OPTIC MOULDING

Optic moulding is a combination of pattern moulding and contact moulding. The hot gather of glass is introduced into a part-sized mould with a simple recurring pattern like panels, ribs, circular bumps, etc. The gather fills the mould, is removed, placed in a full-sized mould of any number of pieces and design, and blown to full size. The enlarging process transfers the part-sized design to the interior surface of the glass, leaving the full-sized mould configurations and seams, if there are any, on the exterior surface of the glass.

This method of manufacturing decorated ware is also done by machine manufacture.

Characteristics

1. It is unusual to find this method of manufacture used for bottles or containers; optic-moulded tablewares are more common.

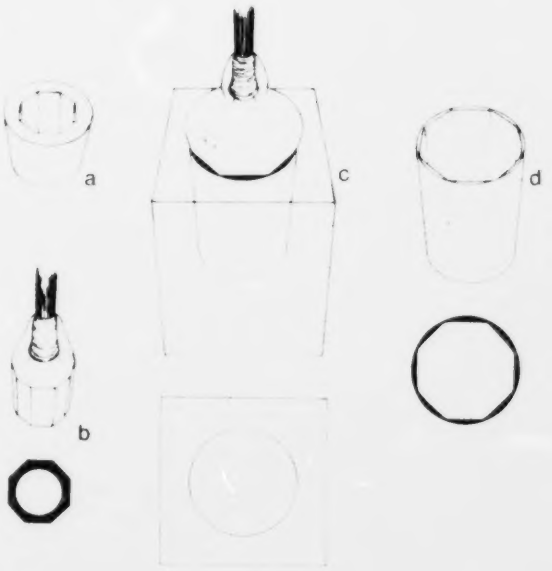


Figure 13. The process of optic moulding, based on Larsen, Riismøller, and Schlüter (1963: 389). (a) The part-sized mould with a pattern of panels. (b) The pattern-moulded parison. (c) The parison expanded in a smooth unpatterned dip mould. (d) Finished tumbler with the panel pattern on the inside of the object and a smooth exterior.

2. The pattern has transferred to the inside surface of the object; the exterior glass surface exhibits the configurations of the full-size mould, which may be any one of the contact types previously described.
3. The vessel will feature mould-blown characteristics: symmetry on full-sized moulded parts; surface texture from mould contact; mould seams where appropriate.

Dating

The technique has been in use from at least the 18th century to the present day, including machine manufacture. Examples of optic-moulded tumblers are relatively frequent in 18th century French contexts in Canada. The technique had a revival in the late-19th and early-20th centuries (see for example Budde and Westermann 1913: 29-30, 33).

PRESS MOULDING

Sufficient hot glass to make the object is dropped into a mould of any number of pieces, the only limitation being that a plunger must enter and leave it without the mould being opened. There may or may not be a design embossed on the interior surface of the mould, i.e. the area that the glass comes in contact with. A plunger is introduced, forcing the hot glass into conformity with the mould. The glass takes the form of the mould on its outer surface, while the inner surface is shaped by the plunger. The plunger is withdrawn and the object removed from the mould. The object may be fire polished to restore to the glass surface the brilliancy which has been lost by contact with the mould.

Characteristics

1. Generally the press-moulded section of the object must be open-topped so that the plunger can be removed, although press-moulded narrow-mouthed vessels are possible by further manipulation of the glass. An object may exhibit features of partial press moulding and partial mould blowing, or further manipulation of some kind.
2. Unlike blown glassware, the inside of the vessel is shaped by a plunger; the outside shape and design need have no relation to the inside shape and design.
3. Mould seams, if there are any, are sharp and distinct, unless they have been purposely removed.

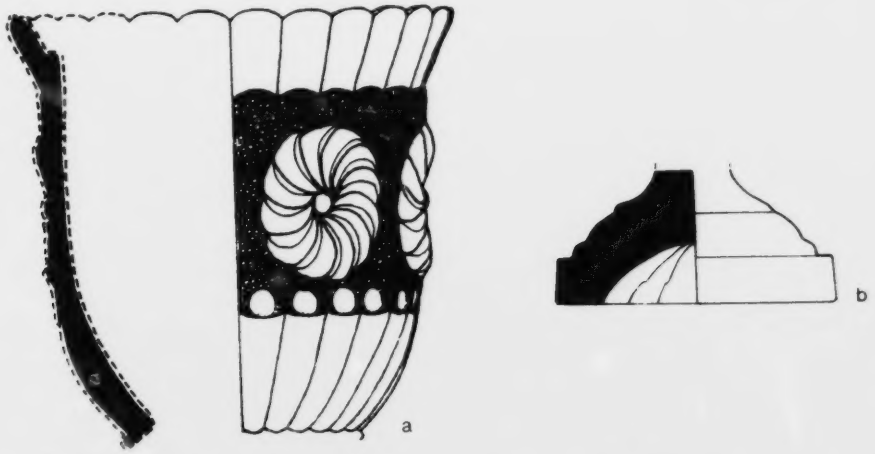


Figure 14. (a) A press-moulded bowl showing the characteristic features of press moulding. (b) "Lemon-squeezer" foot which would have been manufactured in a hand-held presser and attached to a stemmed vessel. The "plunger" was decorated with the lemon-squeezer design which is on the underside of the foot.

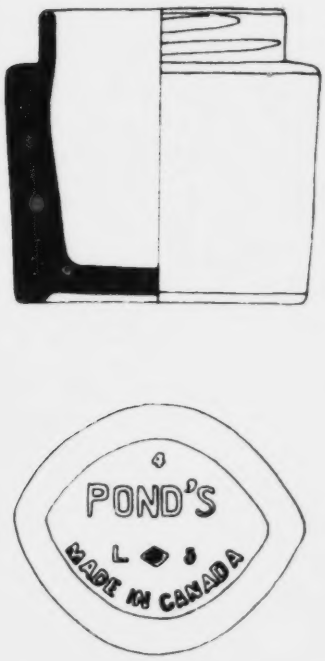


Figure 15. A commercial container manufactured by press moulding.

4. Any number of finishing techniques may be practiced on a press-moulded object: glass may be added and a small-mouthed neck and finish applied; the whole object may be cut to form flat sides with flat bevelled corners; the exterior design may be "touched up" at the cutting wheel to make the strokes more closely resemble cut ones.
5. There is often difficulty in distinguishing between cut and press-moulded glass. The following differences can usually be observed: the glass surface texture on a cut piece is polished, smooth, and glossy, whereas pressed glass has a disturbed surface texture which was sometimes disguised by an all-over stippled design; the edges of a cut design are sharp and distinct whereas a press-moulded design has a tendency to have rounded edges; a cut design tends to be geometric, consisting most commonly of panels, flutes, and mitres, but press moulding can create a great variety of designs, including "lacy" patterns, stippled areas, and naturalistic views, as well as geometric designs; cut designs are often slightly uneven (e.g. the individual strokes making up a star motif may be of different lengths, panel heights may vary, etc., although on very high-quality well-done pieces these defects are minimal or non-existant) whereas pressed designs tend to be more perfectly executed; the pontil mark on a cut piece may be finished or unfinished while the resting surface on a press-moulded tumbler is often polished; a cut piece tends to have no mould seams (these having been polished off if there were any) whereas press-moulded pieces usually have mould seams.
6. This production method was not widely used for manufacturing commercial containers except for jars; finer pieces like ink wells and cosmetic containers intended for display occur more often, and press-moulded tableware objects occur frequently on sites from the mid-19th through the 20th centuries.

Dating

Press moulding was used in England on a small scale beginning in the late-17th century to manufacture small solid glass objects such as imitation precious stones, glass seals, watch faces, etc. (Buckley 1934: 187). The technique was called pinching and involved two mould halves on long handles (see Pellatt 1968: 315). By the 1780s, the technique was being used to make objects such as decanter stoppers (Fig. 134) as well as parts of objects such as feet; however complete holloware glass objects were beyond the capabilities of this technique. Major changes in pressed glass technology in the United States during the late 1820s led to the pressing of complete tableware objects such as tumblers, salts, cup plates, and other items (Watkins 1930: 84-86). By the early 1830s the mass production of lacy pressed tableware was well under way in New England and western Pennsylvania. From there it spread to other places in the United States and somewhat later to Canada. In 1834 the Richards Glass Works in Stourbridge, England, adopted the technology to produce pressed tableware (Watkins 1930: 89).

Early pressed glass objects are predominately in colourless lead glass. In 1864 William Leighton of the Hobbs, Brockunier Glass Works in Wheeling, West Virginia, developed a "lime" glass which looked like lead

glass, had excellent pressing qualities, and was about one-third cheaper than lead glass (Revi 1964: 183). During the 1860s and 1870s many advancements in mould technology and the application of steam power to mould operation greatly lowered cost and increased production of pressed glass (Revi 1964: 4-6). Non-lead pressed glass becomes common on Canadian sites after the 1860s. Many patterns were produced and these can often be identified in such sources as Lee (1944; 1960; 1966), Revi (1964), and Stevens (1961; 1967).

Press moulding is now done entirely by machine.

Machine-made Container Manufacture

During the late-19th century a general move was being made towards mechanization in the container industry. Glassmakers in Germany, Britain, France, and the United States were devising machines that would mass produce containers of fixed capacities with finishes to accommodate complex, standard-sized closures. There were many semi and fully automatic bottlemaking machines patented during this period, the most significant of which have been discussed by Miller and Sullivan (1981).

Machine-made containers are holloware bottles and jars shaped by air pressure supplied by a machine. Semi-automatics are manually supplied with gobs of molten glass and several containers may be produced at one time; fully automatic machines do not require any manual labour. Both types of machines can produce the same types of objects, probably with similar evidence of manufacture. Both form the container's finish portion first, using a separate ring mould. The body of the container is shaped by a parison mould which distributes the glass and gives it an initial shape, much as marvering does in hand blowing; then the container is transferred to a full-sized mould that forms its final shape and size and imparts any embossed letters or designs to its surface. Machine production of glass containers follows these steps:

1. A gob of molten glass enters the ring and parison moulds and is forced by air pressure, suction, or a plunger to take the shape of the full-sized ring or finish mould and that of the part-sized parison mould.

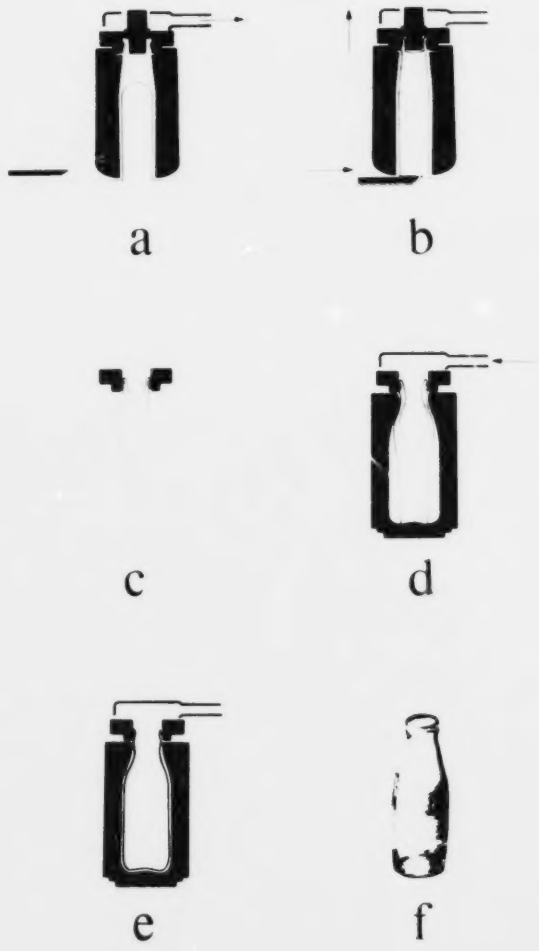


Figure 16. Mechanical forming of glass containers: the Owens suction-and-blow process. (a) The gob is sucked up into the blank mould. (b) The neck of the container is formed and the glass gob sheared off at the base. (c) The blank or parison shape with the ring mould still attached. (d) The blank shape is transferred to a full-sized mould and blowing begins. (e) The container's final shape is blown. (f) A finished bottle.

2. With the finish ring mould still attached, the parison mould is removed. In some cases the body of the parison is allowed to elongate.
3. The full-sized or blow mould is joined to the ring mound around the part-sized container and the bottle is blown to full size by air pressure.

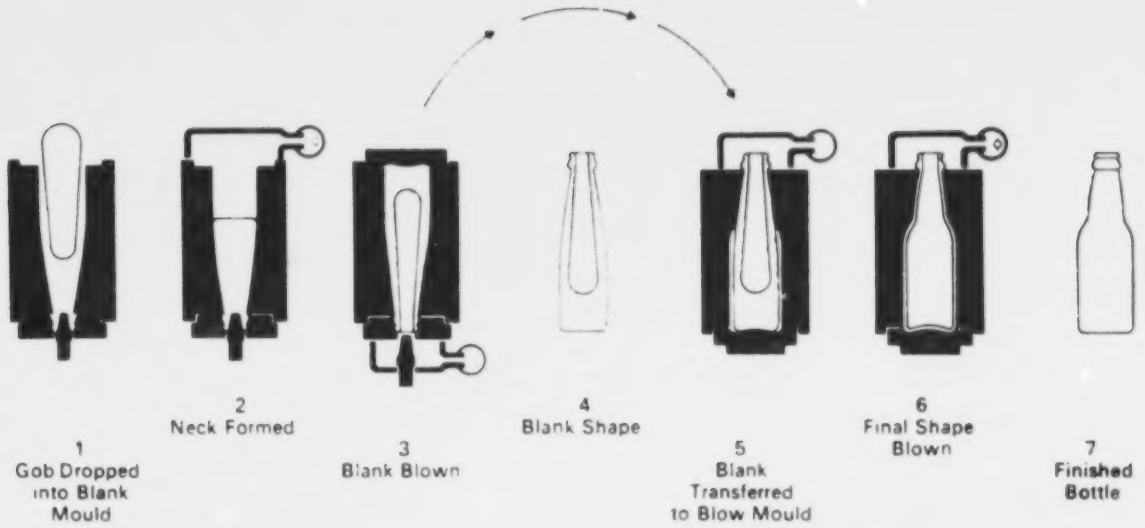


Figure 17. Mechanical forming of glass containers: the blow-and-blow process. (Published with permission of Glass Manufacturers Federation 1973: 25.)

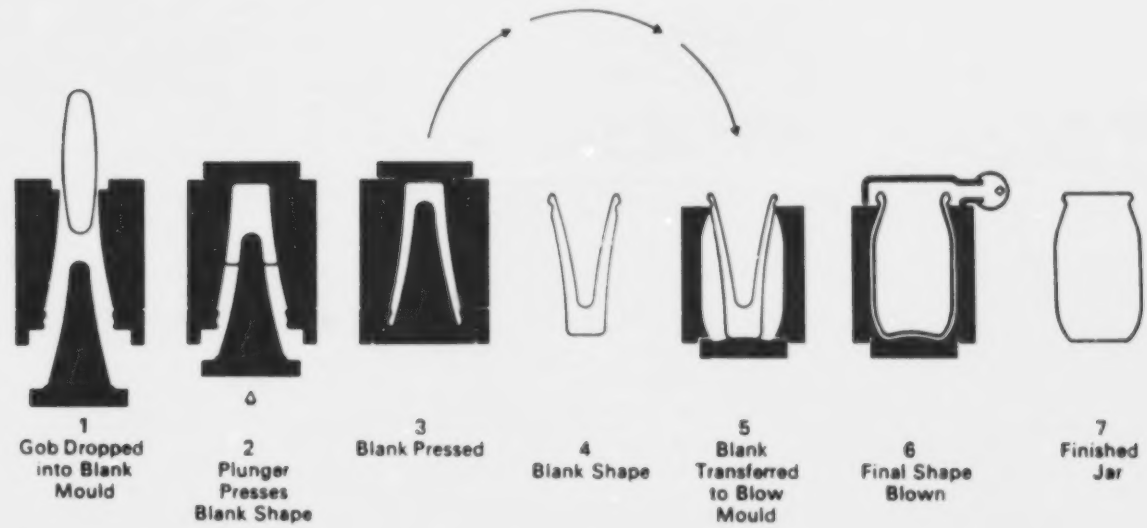


Figure 18. Mechanical forming of glass containers: the press-and-blow process. (Published with permission of Glass Manufacturers Federation 1973: 25.)

Characteristics

The main difference between semi-automatic and fully automatic machines was in the rate of production due to the degree of mechanization, not in the appearance of the container. Bottles produced by either method should look very similar and have similar "typical" mould seams.

1. A large number of mould seams, particularly related to the finish: a) One or two

Figure 19. Two bottles showing typical machine-produced mould seams, including, on (b), a "ghost" seam from the parison mould on the body.

horizontal mould seams around the top of the finish or lip caused by a neck-shaping plug and a collar to guide it. On beer and beverage bottles these seams have sometimes been fire-polished off, so other evidence of machine manufacture must be sought. (b) Horizontal mould seam encircling the neck-finish junction. This seam must appear with other machine-made characteristics; an 1860 patent for hand-blown bottles featured this seam. (c) Continuous vertical mould seams up the side of the body and over the finish.

2. Body seams: (a) Wandering vertical "ghost" mould seams on the body of the container, left by the parison mould halves, which join the full-sized mould seams at the finish. A "ghost" seam is certain proof of machine manufacture.

3. Base seams: (a) Either cup or post bottom mould seams can appear on machine-made bottles and should not be confused with the mouth-blown versions. (b) Owens scar, a distinctive, circular mark with "feathery" edges, caused by the shears that cut off the gob of glass in the suction machines. An Owens scar is usually off-centre and may sometimes even extend onto the heel; it dates from 1904 (Fig. 22). (c) Valve mark, a non-symmetrical indented groove, may appear on the bases of wide-mouthed containers and milk bottles (see Fig. 23). (d) "Ghost" seam from the base part of the parison mould appears on some machine-made container bases (see Body seams).

Figure 20. Close-up view of a wandering "ghost" mould seam on the body of a container.

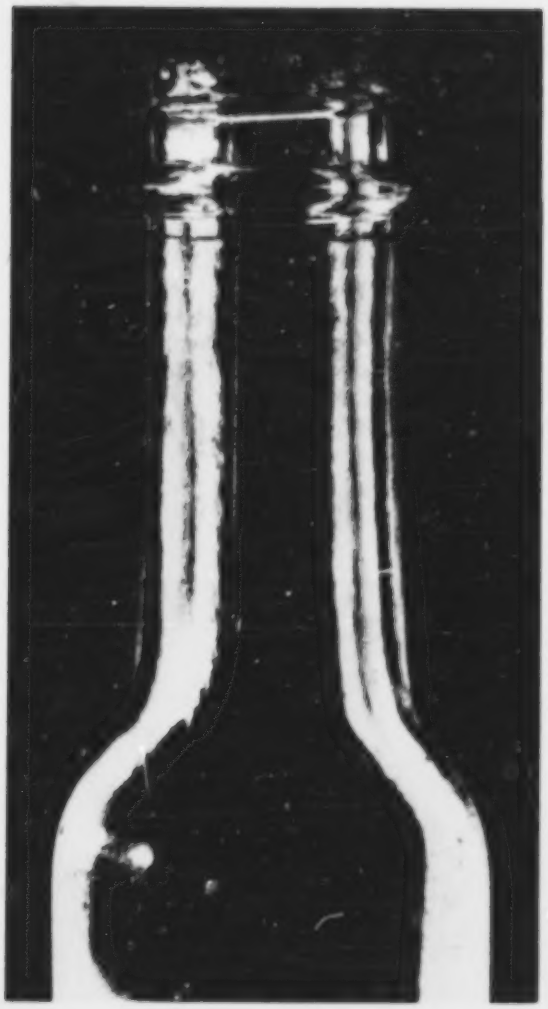


Figure 21. Close-up view of a container finish, showing the large number of seams by the mould parts.

Dating

Workable semi-automatic machines were patented in the United States by Philip Arbogast in 1881 and in England by Howard Ashley in 1886. In France, Claude Boucher had machines operating successfully by 1897, and in Germany, the Schiller Semi-Automatic press-and-blow machine was being used by 1906. All were semi-automatics. Arbogast's machine had limited use and produced only wide-mouthed containers, such as vaseline, fruit, and other jars; Ashley's machine made small-mouthed bottles, but ran into strenuous resistance from glassworkers' unions. The most successful bottle-making machines in the early period, and the first fully automatic, were developed by Michael Owens beginning in ca. 1903. In his design, the parison mould dipped into a revolving pot of molten glass and vacuum action sucked the gob up into the mould. This type of machine leaves a feathery-edged scar on the bottle, but in all other respects bottles made on Owens' machines are similar in appearance to those made on other

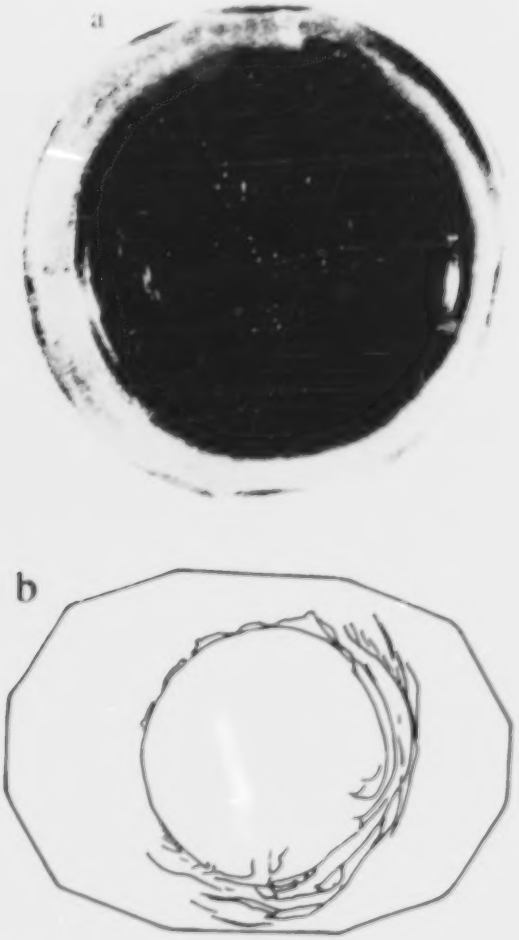


Figure 22. An Owens suction scar caused by shearing the glass when the mould is full (see Fig. 16b). The shears cause the glass surface to cool slightly, leaving a scar from the cutting action. (a) Also shows the base and heel mould seams from the parison mould.

types. The extent of use of Owens' machines by the second decade of the 20th century is attributable to vigorous promotion in the United States, Canada, Britain, and Continental Europe, and to the variety of containers, both large- and small-mouthed in sizes ranging from 3 ounces to carboy, that could be produced on Owens' machines. However, the licensing system used by the Owens Company, the high price of the individual moulds, the inherent lack of versatility (Owens' machines were economical to use only for very large production runs), and the cost of fuel to operate the revolving tank furnace all contributed to replacement of Owens' machines by other types, the most significant of which was an Individual Section gob feeder developed in the United States during the 1920s. These permitted more flexibility in production in that smaller run orders could be executed, and were also less expensive to purchase and to operate. Hand production of bottles and jars declined rapidly from the second decade of the 20th century, but the period of overlap for hand and machine production is fairly long. Bottle types being blown by hand were continually being reduced as new moulds were developed for machines and small-run hand blowing became increasingly uneconomical.

The chronology of mechanization for production of glass containers is approximately as follows:

1. Semi-automatic machines for wide-mouthed containers: commercial production begins 1893, peak ca. 1917, end ca. 1926.
2. Semi-automatic machines for production of narrow-mouthed containers: commercial production begins 1889, peak ca. 1917, end ca. 1926.
3. Fully automatic production on the Owens machine for narrow- and wide-mouth containers: commercial production begins 1904; by 1917 half of the bottles in the United States were being made on Owens machines; began being replaced by feeders in the 1920s; end of production around the late 1940s or early 1950s.
4. Semi-automatic made automatic by flow-and-feed devices: introduced in 1917, continued to grow in importance and offered an inexpensive alternative to the Owens machine.
5. The Individual Section Machine developed in 1925; by the 1940s this had become the machine most commonly used in producing bottles.

Figure 23. A valve mark on a bottle base. Toulouse (1969: 583) says that this mark is caused by a valve that ejects the parison out of the mould so that it can be transferred to the blow mould for completion.

Hand-blown bottles lasted into the 1930s but only for small run types such as pharmaceutical bottles, cosmetic wares, and demijohns. Their quantities would be very small in any post-1920 archaeological assemblage.

Miscellaneous Manufacturing Techniques

FINISHES AND RIMS

Finish — The top part of the neck of a bottle or jar, made to suit the cap, cork, or other closure (BSI 1962: No. 6302). In hand glassmaking this was the last portion to be shaped (the container was "finished") but in machine glassmaking the finish is formed as part of the very first operation. The finish consists of a bore, lip, and string rim, if there is one (see Part II. Glass Containers).

Rim -- The finished edge of an item; a single object may have more than one rim, e.g. a stemmed drinking glass has a rim on the bowl and a rim on its foot; a lamp chimney has an upper and a lower rim.

The finish portion of a bottle should not be called a "rim" and the rim of a tableware object should not be referred to as a "finish."

The formation of the finish or rim can be accomplished in a number of ways:

Cracked-off -- In the process of mouth blowing, the object must be detached from the blowpipe. This is done by scoring the glass near the blowpipe with a wet file or other tool to create a localized thermal tension. A sharp tap on the blowpipe detaches the glass object. The crack-off surface is flat and uneven with sharp, often jagged edges (Fig. 57). When the lip of an object is left this way, i.e. when it is not further treated, it is described as being "cracked-off." Cracked-off lips are confined almost exclusively to containers.

Fire-polished -- A common way of smoothing the lip of an object is to expose the unfinished rim of the object to the heat of a furnace or, in modern times, to a jet of gas flame. This localized heat causes the crude edges to become smooth and the glass draws back slightly, forming a rounded, somewhat thickened or "beaded" rim (Figs. 57, 58). This method is so commonly used on tableware rims that it is usually not mentioned when describing the manufacturing technique.

Ground -- The ground surface can be on the top of the lip or rim, on the upper surface of the neck, or in the bore, and is done when the object is cold. Generally grinding can remove the evidence of the manufacturing techniques. There are three types of grinding associated with rims and finishes. (a) Rough grinding. The surface is roughened, not polished, and looks greyish-white and frosted. It is done to remove excess glass and/or to prepare the object for a specialized closure or fitment. Roughly ground surfaces are found on containers such as fruit jars, and on tableware such as cruets or decanters (Figs. 24, 105). (b) Polished grinding. Generally found on the rim, the ground area is highly polished, as is cut glass. The edges of the rim or lip are often chamfered. Polished grinding appears to be an alternative to fire polishing, and is found on tableware rims such as stemware bowls, cover rims, etc. Polished grinding can be identified by close examination of the rim area. (c) Decorative grinding. The rim is decorated by cut and polished motifs such as scallop or sawtooth (Fig. 48).

Manipulation -- The glass at the top of the object is reheated and then tooled with hand-held tools to form the desired shape. Common manifestations of this technique are everted lips, flanged lips, and lips or rims that are folded in or out (Figs. 57-59).

Added glass -- Extra glass is added at the top of the object to assist in the formation of the finish, lip, or rim. Glass added to form the rim or lip is always tooled, but a string rim added to the finish portion of a container may or may not be tooled.

Applied lip -- This term is commonly used in bottle collecting literature. Unfortunately its use is so broadly interpreted as to render it meaningless. The originator of the term, Tibbitts (1964: 3), uses it as "any lip or mouth that was hand worked after the bottle was broken off from the blowpipe. Among others it includes sheared lip, applied collar below sheared lip, applied blob, etc." Adams (1969: 114) defines applied lip as "any bottle made before 1900 where the mouth was formed after being separated from the blowpipe." Obviously both definitions include all of the more specific techniques named in this glossary. The term should not be used because precise descriptions are more valuable.

Finishing tool -- A hand-held tool used to form the finishes of containers. The finishes these tools were used to make included those with external features such as one- and two-part finishes, helical threads, and internal bore features like threads and ledges (see Finish-forming Tool; Fig. 25).

Moulded -- The rim or finish can be formed in the mould at the same time as the rest of the object is made. This can include wares that are mouth-blown, press-moulded, or machine-made; press-moulded and machine-made glassware is discussed in the appropriate sections (for mouth-blown

moulded finishes, see blow-over and burst-off moulds below).

Burst-Off

Hot glass is mouth-blown into a mould until it fills the mould. Continued blowing results in a thin bubble of glass expanding over the mould. This is easily burst, leaving the object with a jagged top. The top can be subjected to further treatments, such as reheating, manipulation, or grinding, which remove evidence of the burst-off technique having been used.

Characteristics

1. The top of the neck has a rough jagged edge (Fig. 58).
2. The surface of the bore thins out rather abruptly towards the outer surface, just under the jagged edges.
3. Vertical mould seams on the neck continue up to the edge of the lip.
4. There is usually a horizontal mould seam or bulge encircling the neck just below the jagged lip, resulting from the glass expanding out over the mould.
5. The object can have been formed in a mould of any number of pieces or configuration.
6. There is no pontil mark as the finish or rim was made either in the mould or after the object had cooled.
7. Burst-off finishes are found primarily on small-mouthed containers for sauce and ink. The finishes are more common on British-made bottles than on American ones. Burst-off lips are also found on lamp fonts as the rough lip was covered by the metal fitting which was cemented to the glass.

Dating

Pellatt (1968: 96) describes this technique as it applies to table glass manufacture in the 1840s, and implies that the method had been in use for some time in that branch of the industry. Generally, however, evidence of its use has been obliterated by further working of the glass either hot or cold.

Objects with burst-off lips seem to date to the second half of the 19th century and, possibly, into the 20th century.

Figure 24. Jar manufactured in a finish-forming mould. Mould seams run the length of the object and the lip has been ground flat.

Blow-back and/or Blow-over Container Mould

The complete container is blown in a mould which includes base, body, and finish. The mould extends for a short distance beyond the finish. When the container is removed from the mould there is excess glass above the finish, which is ground off when the container has cooled.

Using this technique it was possible to provide distortion-free regular finishes in quantity. The method was particularly used for containers with screw threads, lugs, etc.

Characteristics

1. The top of the lip has been ground to remove the excess glass.
2. There is an external finish feature designed to accommodate a specialized closure.
3. The glass will form in the finish area as it does in other contact moulds, i.e. with a concave-convex relationship.
4. Vertical mould seams continue over the finish to the ground surface.

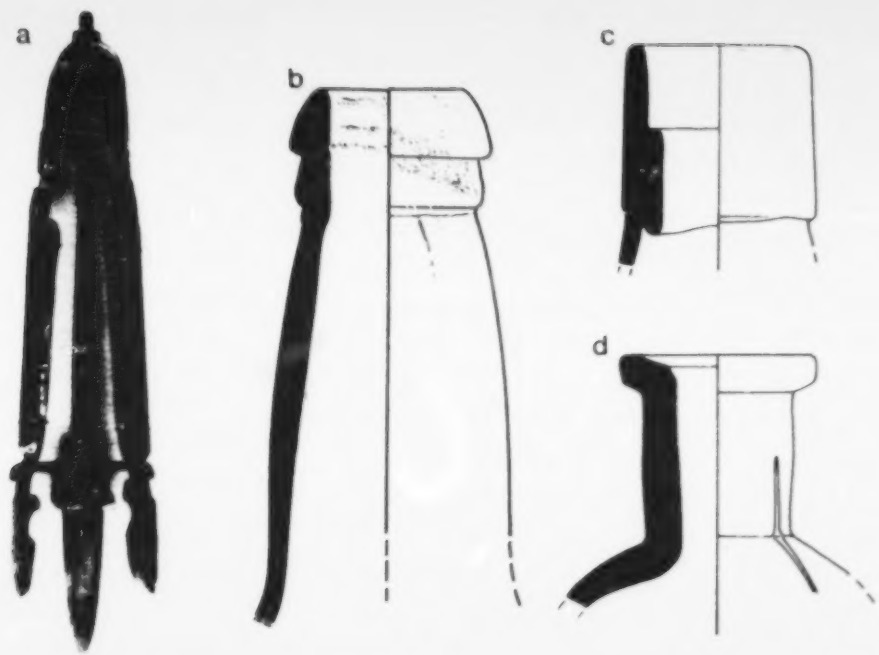


Figure 25. (a) Finishing tool. (b, c, and d) Three examples of finishes formed by finishing tools with different configurations on the plug and jaws of the clamp.

5. There is no pontil mark, as the finish was shaped in the mould and the lip ground when the container had cooled.

Dating

Mason's 1858 patent for the screw top fruit jar is considered to be the first workable one of its kind issued in the United States, although there are claims that the technique was known to American manufacturers at an earlier date (see Toulouse 1969a: 428-29 and 1969b: 583).

Generally the blow-back and blow-over moulds were replaced by machines. By the early years of the 20th century the wide-mouthed containers with ground lips were disappearing; narrow-mouthed containers continued to be made in this type of mould probably until the 1920s.

General dating is 1850s to ca. 1920.

Finish-forming Tool (Finishing Tool)

This tool was a hand-held or bench-mounted clamp with a central plug. The plug determines the size and shape of the bore, making it smooth and uniform or forming internal bore features. The two jaws of the clamp have the contour desired for the external finish.

Characteristics

1. Neck mould seams, if the neck was formed in the bottle/body mould, may have been erased part way down the neck by the rotating jaws of the finishing tool.
2. The finish is symmetrical and usually tidy, although excess glass may have been squeezed down to the bottom of the finish and deposited on the neck.

3. Horizontal turn lines may appear on the surface of the glass, above the point at which the mould seams were erased.
4. Finishing tools were used to make features in the bore of bottles, like threads, ledges, etc., as well as shaping the lip and string rim.

Dating

"Wine" bottles with seals dated in the mid-1820s have finishes formed with a finishing tool. Finishing tools were being used in English and Scottish factories in about 1828 (Bontemps 1868: 512). An English patent for 1844 (Great Britain, Patent Office 1857b) describes a tool of this sort as being in common use among glassmakers. The tool was not much used in France until the 1860s and 1870s (Bontemps 1868: 513). Finishing tools continue to be used for mouth-blown bottles. A general end date for our sites for finishing tools is the mid-1920s, the end date for mouth-blown commercial containers.

General dates for the use of the finishing tool are 1820s to 1920s.

BASES AND FEET

Base — The base is the bottom part of an object.

Foot — A foot is a horizontal projection which may or may not be joined by a stem to the rest of the object.

The formation of the base or foot can be accomplished in one of several ways:

Hand-tooled — Basal profiles are shaped by a variety of hand-held tools (for a discussion of some of these tools see Jones 1971). Only in particular instances is the identification of the pushup-forming tool useful in ascription. For containers, hand tooling of bases became increasingly infrequent in the second half of the 19th century. Hand-tooled tableware continues to be made. Feet are also shaped using various types of tools (a specialized foot former is illustrated in Larsen, Riismøller, and Schluter 1963: 371, 382, and in Kulasiewicz 1974: 69).

Moulded — The base or foot can be shaped in the mould at the same time as the rest of the object is made; construction of the mould varies. Moulded bases and feet are formed by mouth blowing, press moulding, and machine manufacture (see also Separate Base Part). Moulded bases can be identified by the presence of embossed markings or decoration on the basal surface, by the positioning of the mould lines on the base or the heel, by the symmetry of exterior shape, and/or by vent marks.

Cut — Various areas of the base may be roughly ground or cut and polished, including the whole basal surface, the resting surface, or the pontil mark (see "Cutting" in Miscellaneous Techniques and Part III. Glass Tableware, Manufacture).

Separate Base Part

The base of a mouth-blown object may be hand-formed after the object is removed from the mould, or the mould in which the body is formed may have a base-moulding part. In the two-piece mould, for example, the base may be formed at the same time as the rest of the object. Other moulds have a separate base part or plate. As well as certain mouth-blowing moulds, the separate base part is found on machine moulds and on press moulds.

There are two types of separate base parts described below solely for the reader's information. When cataloguing and inventorying glassware, we make no specific mention of the type of separate base part used because the fact does not contribute as effectively to attribution or to dating as some other techniques do.

Characteristics

1. There is a mould seam left by the base part. The vertical body seams, if there are any, join it.
2. There may be embossed letters and symbols and decoration on the base, as, for example, on Ricketts-moulded bottles. For dating purposes these should be distinguished from letters and symbols on the bases of machine-made bottles.
3. The base mould may be made up of a number of base parts, each one leaving a mould seam.

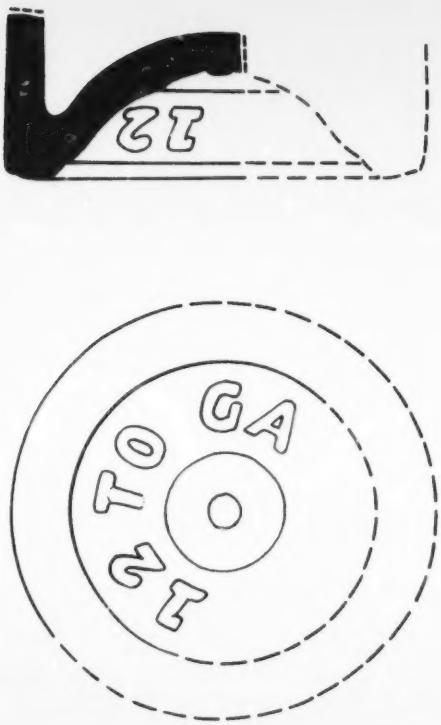


Figure 26. A separate base part which has left its own mould seam on the heel of the bottle. Separate base parts do not always have commercial markings.

4. In addition to containers, holloware tableglass objects and glass lamps can have been made in moulds with separate bases.

Dating

A key element in the Ricketts' patent of 1821 was the formation of the base in the mould, using a separate, moveable base part; however forming bases outside the mould for "wine" bottles continued for several decades. Whitall, Tatum & Co. (1971: 9), in the 1880 catalogue, have a small note advertising bottom lettering plates for bottles. These plates could have been advertising space for the purchaser, but the bottlemaker often embossed the bases of the bottles with his own mark (see Commercial Marks).

Figure 27. (a) The base of this bottle has been formed by an oval-shaped post and the body shaped in a two-piece mould. (b) An ink bottle manufactured by a two-piece mould and separate cup base mould.

(A) Post bottom mould

This is a raised area centred in the bottom part of the bottle mould which forms all or part of the bottle base. It gives the container a well-formed, centred concavity, and is used on containers formed in a mould of any number of pieces.

Characteristics

1. Toulouse (1969b) seems to indicate that the "post" is always circular, but there is no reason to assume that oval posts were not also used on flat-sided containers to repeat the horizontal shape of the bottle (Fig. 27a).
2. The "post" leaves a mould seam, and the profile is usually a shallow indentation.
3. The post bottom seam is located on or inside the resting point. The vertical body seams, if there are any, join the post seam.

(B) Cup bottom mould

The hot glass fits into, instead of onto, the base-forming area of the bottle mould. "The part that shapes the bottom of the bottle is cut into the bottom plate as a small depression or cup" (Toulouse 1969b: 582).

Characteristics

1. A horizontal mould seam on the heel above the resting point. This feature may be accompanied by a bevelled heel.
2. The vertical body seams, if there are any, join the cup bottom seam.

Dating

Generally, this is found with two-piece vertical body moulds and also on machine-made bottles, and is useful only in a very general way for dating containers. A general date would be ca. 1850 to the present.

Empontilling

The pontil is a long iron rod attached to the base or bottom of an object that is still hot to hold the object while the lip, rim, or finish is being formed (Fig. 1c). When the pontil is detached from the object there is a scar left on the base, called a pontil mark. Four different empontilling methods have been identified based on the distinct pontil marks left on the bases of glass objects. They are glass-tipped pontil (Fig. 102), sand pontil (Fig. 99), blowpipe pontil (Fig. 99), and bare iron pontil (see Jones 1971: 68-72 for detailed explanations of each type).

On tableware items the pontil mark was frequently removed by grinding and polishing, leaving a shallow concavity in the base or bottom (see Fig. 102).

Dating

In use since Roman times, the pontil was gradually replaced by the snap case (see below) beginning in the late 1840s (McKearin and Wilson 1978: 517; Pellatt 1968: 95).

Based on archaeological evidence in North America and on the general opinions expressed in contemporary literature, the snap case had largely replaced the pontil in container manufacture by the early 1870s. Some use of the pontil continued after that date, e.g. in the manufacture of demijohns. It would appear, too, that many bottlemakers in Europe continued to use the pontil longer than their counterparts in North America. For the purposes of dating North American containers a beginning date of ca. 1850 is used for the introduction of the snap case (evidenced by the absence of the pontil mark) and ca. 1870 is used as a general end date for the use of the pontil.

Dating the changeover in the manufacture of tableware is less certain as the use of the pontil in that branch of the industry seems to have continued on a large scale for a longer time than in the container industry.

The use of the pontil has not entirely died out. Pontil marks can still be found on hand-made tablewares and specialty items and on products made in countries such as Mexico, India, and Afghanistan. Empontilling of any sort is unnecessary with machine manufacture.

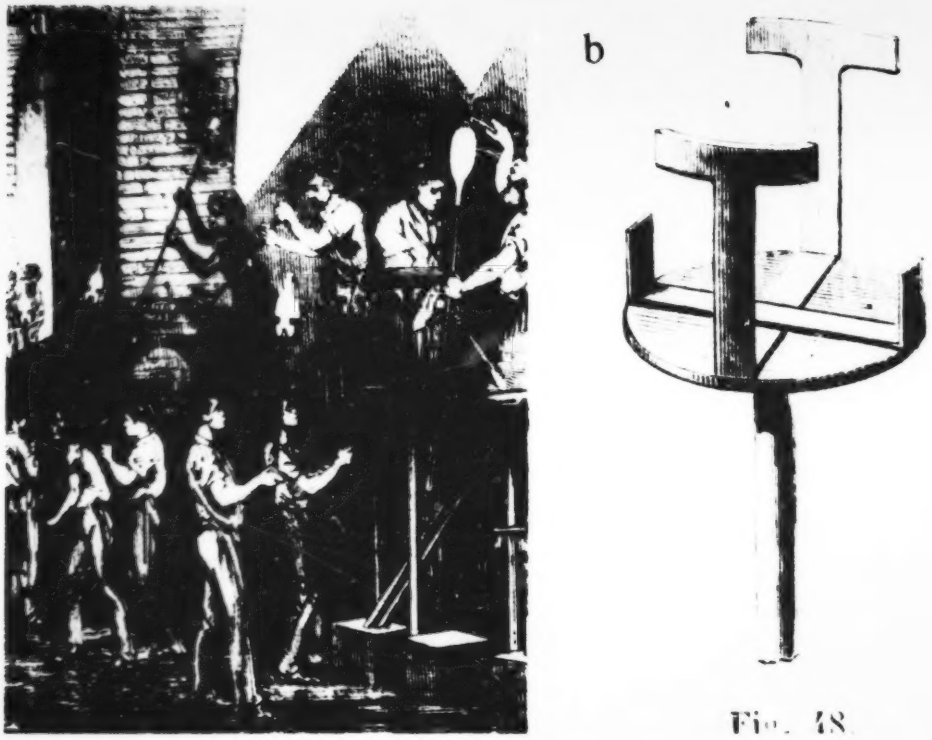


Figure 28. (a) Detail from Peligot (1877: Fig. 17). The completed bottle is being held in a snap case. (b) A snap case (Peligot 1877: Fig. 48).

Snap Case

Variously called spring "snap" or "punty," gadget, *branches en fer*, and *sabot*, the tool is defined as a four-pronged clip attached to an iron rod, a closely fitting case of wrought iron mounted on a long handle from which only the neck of the bottle is allowed to project, etc.

Toulouse implies that a holding device replacing the pontil iron went through an evolution from a simple cradle to a more mechanical snap case (Toulouse 1968: 204-5). Bontemps reports that two versions of the tool were in use simultaneously in France in 1868 (Bontemps 1868: 511). Similar types of gadgets were used for the manufacture of tableware, lamp chimneys, and other glass objects (see Wilkinson 1968: 24-25 for a stemware gadget). We are not concerned with the different sorts of holding devices used while the finish was completed, as none of them seem to have left any identifying marks on the container.

Characteristics

1. No pontil mark of any sort or description is to be found on the container base; the snap case was used instead of the pontil rod. This feature must appear in conjunction with features indicating an attempt to manipulate the finish or upper part of the vessel while the glass was hot. An unfinished bottle, for example, has no need of a pontil or of a snap case (see the sections Burst-off and Blow-back and/or Blow-over Container Mould).

Dating

The use of a snap, or gadget, was known in the glass industry at least by 1849, the year in which Pellatt (1968: 95) published his book on glassmaking. Hand-made glassware without a pontil mark and with evidence of hand manipu-

lation on the upper portion of the object would date after ca. 1850.

VENTED MOULDS

If air and steam do not leave the mould area ahead of the molten glass, pressure builds up and glass may not reach all parts of the mould. To ensure perfect conformity of glass with the mould, small holes were drilled in the mould to allow this pressure to escape.

Characteristics

1. Small embossed dots on the glass surface, on the shoulder, in the mould seams, in embossed letters, on the base, and on the body near the base.
2. Bottles with vent marks have been formed in a mould, so glass should have other indications of moulded manufacture.

Dating

The only reference at hand to the phenomenon of vent marks is a French one of 1877. A three-piece (Ricketts-type) mould of French design has vent holes in the base (Peligot 1877: 304). We will therefore date vent marks from the last third of the 19th century to the 1920s.

Vent marks in mould seams and in letters were intended to be unapparent. Mould manufacturers have succeeded in this endeavour, for we are often unable to say with certainty that the mould in which an object was made was vented. It is possible that vent marks in mould seams and letters pre-date other vent marks.

Vent marks on bottle bodies, on shoulders, and on bases are most easily identifiable.

Figure 29. Two bottles blown in vented moulds. (a) Has one vent mark on the shoulder and the bumpy appearance of the letters is accounted for by vent holes in many of the letters. (b) Has two vent marks on the shoulder with two more on the opposite side of the bottle.

LETTERED AND FIGURED PLATE MOULDS

For whatever reasons, bottle buyers came to enjoy having their own name or that of their product embossed on the body of the package in which their product was bottled.

To buy a complete bottle mould of a fixed size and shape with the embossing of one's choice was an expensive proposition. The alternative was to purchase an intaglio plate in a particular shape, which could be inserted in some standard-shaped bottle moulds and used in moulds of different sizes, within certain limits.

Characteristics

1. Moulded lettering is usually on one side of the container.
2. The information on the plated section is more likely to be advertisement for the seller, e.g. a druggist, than for a product.

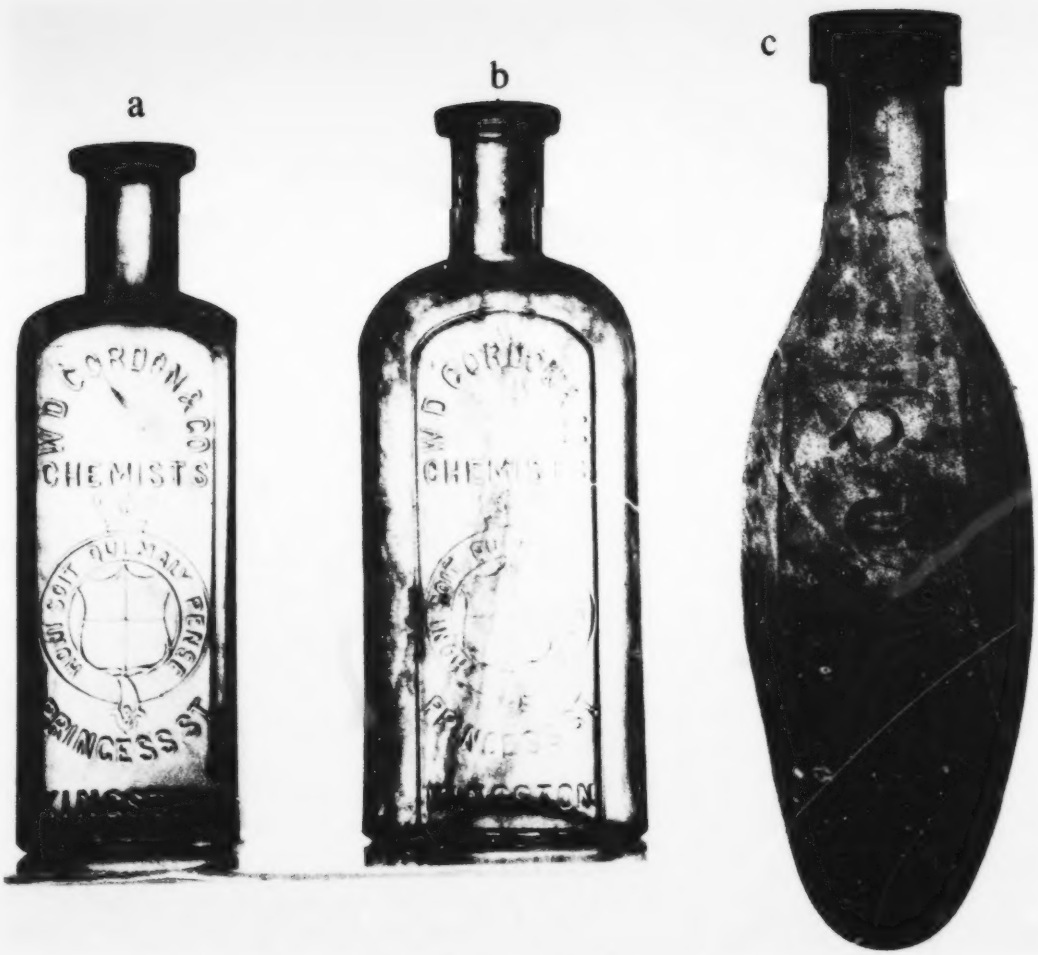


Figure 30. (a, b) Two druggists' shapes with lettered plates. (c) A carbonated beverage bottle with lettered plate.

3. The way in which the plate is introduced into the body mould determines the "mould" seams that are left on the object by the plate. In one type, the plate fits into the body mould seams. This disguises the seams at both sides of a rectangular plate, although the seam marks may still be visible at the top and bottom of the plate. In another type the plate fits into the mould in the centre of the body and the edges of the plate have been designed to leave a raised outline around the embossing.
4. The plates usually come in the following shapes: rectangles with arched tops, rectangles, circles, and ovals.
5. A bottle featuring a lettered plate has always been blown in a mould and may exhibit other mould-blown characteristics.
6. The standard bottle shapes referred to above included ovals, blakes, squares, and mineral water bottles. Bottles of an unusual shape are not likely to have been blown in a plated mould.

Dating

The Ricketts mould, patented in England in 1821, had a removable, ring-shaped plate around the outer edge of the base. Ricketts

stated that any type of embossing could be placed on this plate (Great Britain Patent Office 1857). An official starting date for plate moulds in the United States is a patent of 1867 (Tatum 1900: 20330; Toulouse 1969b: 584). Whitall, Tatum & Co. apparently introduced lettering panels, or plates, in 1868 (Holmes 1974: 277), and by 1880 the company extended its line of lettered plates (Whitall, Tatum & Co. 1971: 7-12) to include rectangular, oval, or gothic panels. Plates are still in use today on machine-made bottles.

General dating for lettered plates on bottle bodies is the last third of the 19th century to the present. However lettered plates for bottle bases date from 1821 to the 1920s and possibly later.

CUTTING

As a manufacturing technique, cutting is performed on the outer surface of a thickly blown or press-moulded object to actually shape the base and/or body, and to leave the object with a smooth polished surface. In this case the cutting is not considered decoration, as it is not used to create a motif but to carve the final shape from a "blank."

Characteristics

1. A smooth polished glass surface.
2. This technique usually removes any other evidence of manufacture, such as mould lines, pontil marks, etc.
3. The technique of manufacturing by cutting is used for such items as ink wells, perfume bottles, decanters, and cruets.

Dating

This technique pre-dates blowing and is still in use for some decorative glass items. Because other evidence of manufacture has usually been removed, it is impossible to date an object based on this manufacturing technique.

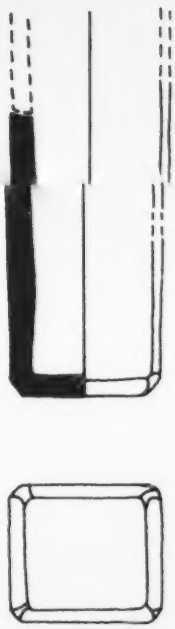


Figure 31. Square perfume bottle with chamfered corners, the body and base formed by cutting.

LAMPWORKING

Lampworking is the art of working with pre-made glass tubing or canes and a Bunsen or other lamp to create new glass forms. This method of manufacture is not appropriate for large containers, but we suspect that some small vials in our collection were made in this way. Lampworking is used to shape glass rods for light bulbs.

Characteristics

1. Small containers having no moulded characteristics, but which are symmetrical in shape and with good glass distribution nonetheless, are likely to have been lampworked.

Dating

Lampworking is a very old method of manufacture, and is still in use today.

GLASSWARE DECORATION

With Hot Glass

COLOUR

Glass is composed of a mixture of silica, usually as sand, alkali in the form of potash or carbonate of soda, and a flux, which is usually lime or oxide of lead. Mixed together and melted at a high temperature, these ingredients produce a greenish or amber-coloured glass. Altering the batch ingredients by the addition of various metallic oxides produces glasses of many colours, or glass which is completely colourless. As well, glass can be made transparent, translucent, or opaque by altering the ingredients (see Colour).

MOULDING

Glassware can be decorated by various types of moulded manufacture, including contact moulding, pattern moulding, optic moulding, and press moulding. Each of these methods of manufacture must embellish the object's shape for the method of manufacture to be considered decoration (see the Manufacturing section of the glossary for details of these methods).

INCLUSIONS

This refers to both glassy and non-glassy material which is intentionally trapped or placed inside hot glass, and includes air, opaque glass, and other materials.

Air bubbles – These are bubbles of air of any shape or size, intentionally trapped inside a portion of an object; they are not present because the glass is of poor quality. Decorative air bubbles are often found in the stem of a wine glass, within a knop or baluster, in the base of a bowl of a stemware item, or in a stopper finial, etc.

Air twist – Air bubbles are encased in hot glass and the glass drawn out to elongate and twist the bubbles. Patterns of the air twist are similar to opaque twist, single or double series, and occur most often in stemware items. If the glass is made of lead, the ascription and date are most likely English, ca. 1740-70 (Hughes 1956: 98-99).

Opaque twist – Opaque twists are formed with canes of opaque glass which have been encased in colourless glass and then tooled or manipulated to form designs of single or double twists. Opaque twists occur in marbles and in stems. A stemware object with an opaque twist has been formed in three parts, i.e. bowl or top, stem, and foot. The opaque glass is most commonly white, but transparent and opaque twists of other colours do occur. The technique was particularly popular in the British table glass industry between ca. 1750 and ca. 1780 (Hughes 1956: 110-11). The opaque twist is a variation of the millefiori technique which dates to the 1st century B.C. In the 16th century the Venetians revived the art of cane forming and manipulation, using canes of glass to fashion filigree, millefiori, and (millefiori) mosaic vessels and beads (Polak 1975: 58).

Mixed twist – This is a combination of air and opaque twist in the same object.

Spangled – Cased glass with a metallic inclusion of biotite or mica between the layers. In the American version the first gather of glass is opaque white or transparent coloured glass; the second layer is colourless. The English variation features a dark opaque body with a second layer of coloured or colourless glass. Both date after 1883 (Revi 1959: 176-81).

Silveria – Silveria was the name given to a process for decorating glassware developed by John Norwood in ca. 1900. However, the decoration itself dated from at least as early as the fourth quarter of the 19th century. The term is now used as representative of a decorative technique in which a thin layer of metallic foil is sandwiched between two layers of tansparent glass, either coloured or colourless (Revi 1959: 189-91).

SUPERIMPOSED GLASS

The following is a list and explanations of some glass-on-glass decorative techniques.

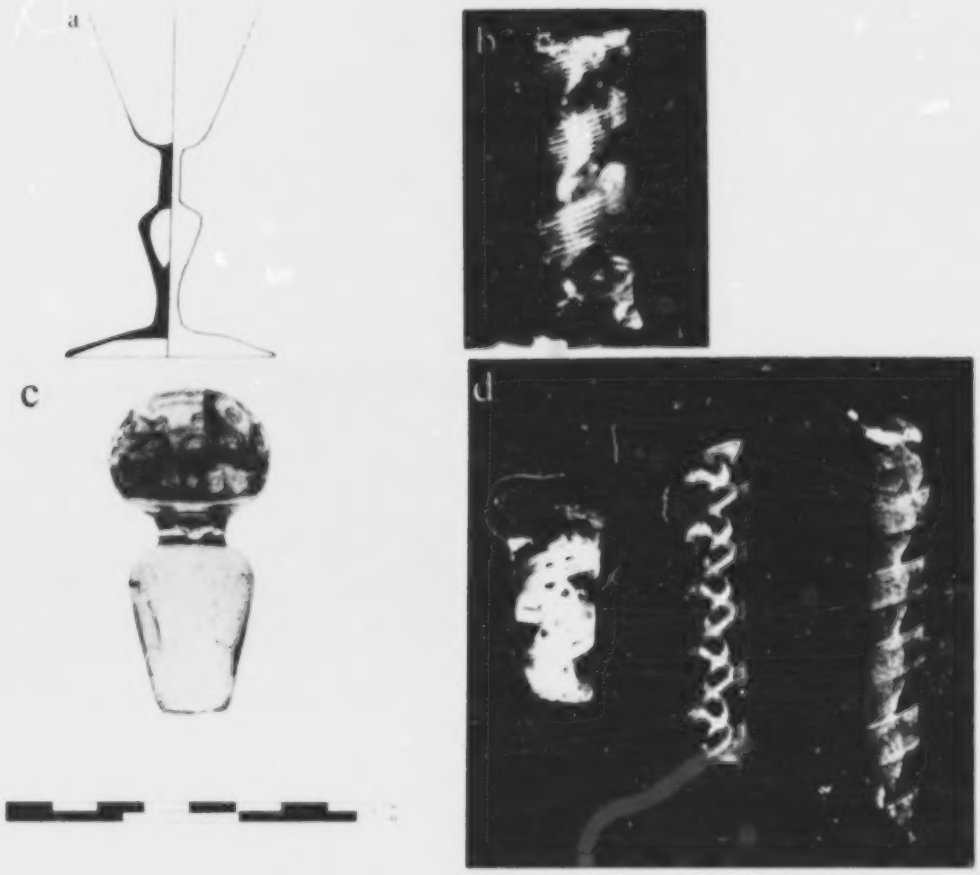


Figure 32. Decoration with intentional inclusions. (a) A stemmed drinking glass with a single bubble of air trapped inside the stem. (b) Stem with twisted air inclusions. (c) Stopper with air bubbles in the finial. (d) Three opaque twist stems.

Threading – Continuous applied threads or strings of glass which may or may not have been marvered into the glass. Threading is used, principally, to decorate necks and rims of objects. Although threads can be applied by hand (see Fig. 1e), an English patent of 1876 made mechanically applied decorative threads possible, and hence more common in the last quarter of the 19th century (see McKearin and McKearin 1948: Pl. 2, Nos. 3, 4, 10).

Banding – An applied ribbon or band of glass which may or may not be marvered into the glass. It can run vertically or horizontally on the vessel, and may be decorated by rigaree or quilling.

Rigaree – An applied ribbon, band, or thread of glass is tooled across its width with parallel lines, thus forming tiny contiguous ribs on the ribbon, band, or thread. This design was produced by ridges on the edge of a small metal wheel. It is a repetitive design, and is used especially on ornamental pieces (see McKearin and McKearin 1948: Pl. 1, No. 1).

Quilling – Sometimes called "pinched trailing," this type of decoration, like rigaree, is added to an applied ribbon, band, or thread of glass. In quilling this added glass has been pinched across its width to produce what looks like exuberant, exaggerated rigaree, standing out in high relief

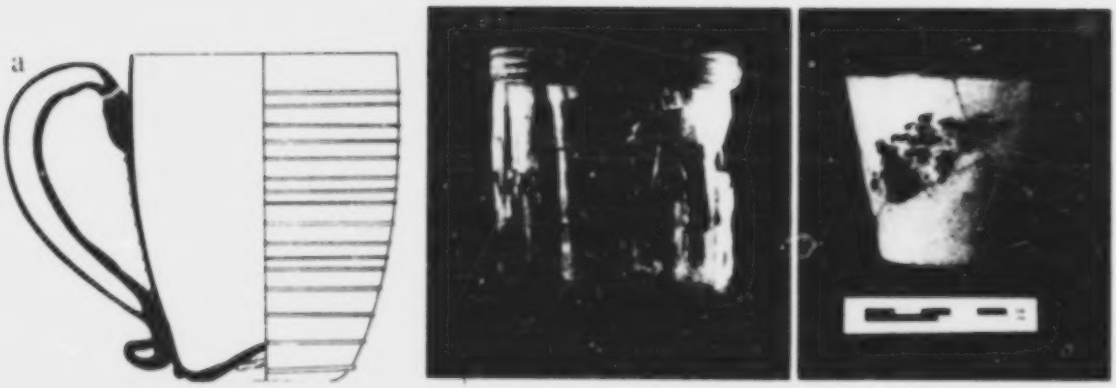


Figure 33. Decoration with applied glass. (a) A cup decorated by applied threads of glass that were not marvered into the body but stand out from the object. (b) A pattern-moulded bowl with applied band of glass at the lip and an applied rigareed band of glass at the heel. (c) An opaque white glass tumbler with a mottled decoration in blue and red opaque glass. These bits of coloured glass have been marvered into the body of the vessel and areas where they have become dislodged appear as pock marks.

from the object. Although the design is repetitive it tends to be irregular, as it was produced manually (see McKearin and McKearin, 1948: Pl. 6, No. 5, and Pl. 7, No. 2).

Prunts — Prunts are blobs of glass applied to an object, which may be tooled or impressed with various motifs, most commonly leaf and raspberry, and henced called "leaf" or "raspberry prunts." They can be applied anywhere on the object surface.

Chain — Sometimes called "guilloche" or "trailed circuit," a chain is formed by nipping at regular intervals sections of glass applied to the object in heavy parallel threads and marvered slightly (see McKearin and McKearin 1948: Pl. 6, No. 2).

Nipt diamond waies — Ribs, formed either by moulding or by applying threads of glass, are pinched together alternately to form a diamond pattern.

Partial casing — A separate gather of glass, called a "pearl" or "purl," was placed over one end of a partially formed object creating a distinct layer or case on the lower portion of the object's body. This extra glass could be left plain or be tooled into a form, like heavily swirled ribs and flutes, swagging, or lily pads (see McKearin and McKearin 1948: 27). Lily pad decoration can vary from slender, usually vertical stems terminating in a beadlike "pad" to a sweeping, curved stem terminating in a rather flat, leaflike, ovoid pad.

Gadrooning — A separate gather of glass (a pearl) was applied to the end of the parison and pulled up evenly, forming a short second layer. The thick portion was blown into a shallow dip contact mould, producing deep vertical rounded flutes or ribs; occasionally, it was manipulated after moulding to give a swirled effect. The finished appearance of this decoration is that of a holder in which the body of the piece rests. It was used to decorate the lower body of bowls, pitchers, celery vases, domed covers, etc. (see McKearin and McKearin 1948: Pl. 7, No. 1).

Casing — Layers of glass of approximately equal thickness are fused together to create an object whose surface layer has a different composition and colour from that of the inner layer(s). The vessel often has cutting to expose the different colours. The famous Portland vase is a superb example of cased glass.

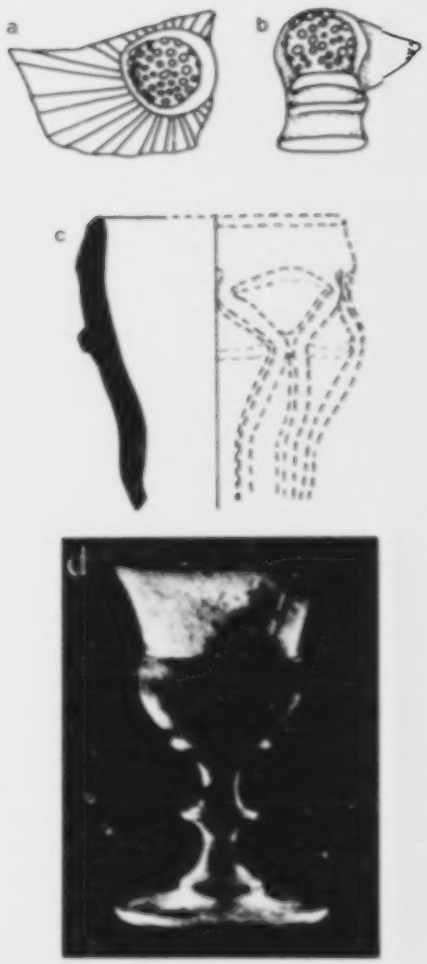


Figure 34. Decoration with applied glass. (a and b) Prunts or blobs of glass, impressed with a raspberry motif. c) A probable salt, with moulded ribs pinched to form nipt diamond waies. d) A stemmed drinking glass, the bowl of which has a partial casing at its base.

Flashing -- A form of casing involving at least one thin layer of glass and one obviously thicker layer which is usually colourless. The thin layer(s) of glass tends to be a deep shade of a colour like blue or red. The layers fuse completely, and are often made more obvious by shallow cutting or engraving. Note: this decorative technique is not to be confused with staining.

Mottled -- The result of this technique is also called "flecked" or "spatter glass." Small pieces of glass of various colours, or colourless, are marvered into the gather, effecting a splotchy appearance on the glass; the whole may or may not be cased in colourless glass. The body of the vessel is often opaque white or coloured glass, and the splotches may have been arranged to produce a specific design or pattern.

MISCELLANEOUS HOT GLASS TREATMENTS

Crackle glass -- Crackle glass, also called *craquelé*, frosted, or overshot, is produced by plunging the parison into cold water and then reheating and reworking it. This technique affects the outer surface of the glass, producing an impression of cracked ice or fissures, while the interior surface remains smooth. The glass is of normal strength despite its fragile appearance. The same look can be achieved by rolling the parison over a marver covered with fragments of pounded glass which adhere to the body, and then forming the object. The technique was originally Venetian, although the Bohemians and French produced crackle glass as well, and it was revived in England in the mid-19th century (see Pellatt 1968: 116-17).

Incised twist -- A tube or cane of glass is drawn through an intaglio matrix to produce sharp and distinct impressions of incised lines on the external surface of the glass. This decoration is found most often on the stem of a stemware item. These incisions can be applied by hand-held tools.

Lynn glass -- An item of glassware, commonly a stemware bowl, tumbler, or decanter, is tooled to produce horizontal ribs or grooves. These are not the lines left on glassware by a clumsy manufacture, but deliberate decoration, and occur in a series of from two to eight lines. The technique is also called Norwich glass or Lynn moulding; the latter term is misleading and should not be used.

Die-impressed -- This is a decorative technique most often used on tumbler bases. A tumber, when nearly completed, is dropped

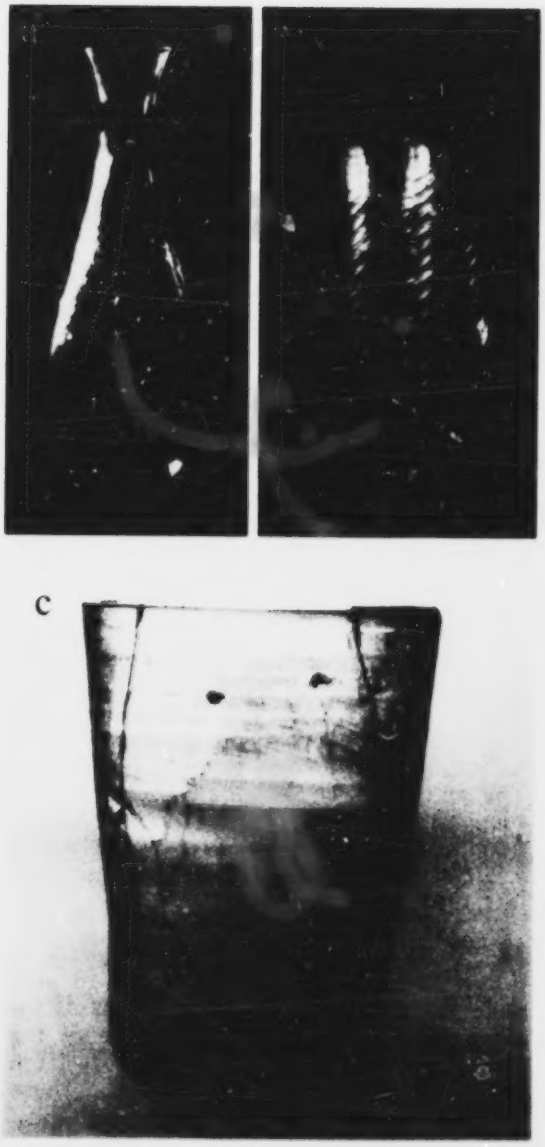


Figure 35. Miscellaneous hot glass decoration. (a) A modern carafe with crackle glass decoration. (b) A bottle neck fragment with an incised twist decoration on the exterior surface. (c) Lynn glass tumbler.

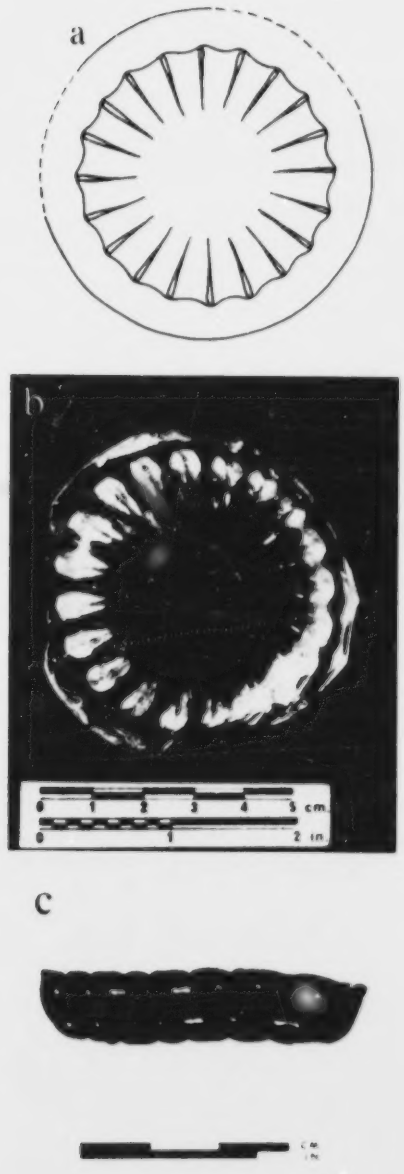


Figure 36. Miscellaneous hot glass treatments. (a and b) Two tumbler bases that have been die impressed. (c) Probable stem fragment in blue glass, twisted.

onto a die and allowed to sag over the design of the die. The examples of this technique in the Parks Canada collection have a raylike design.

Twisted glass — This is an unusual decorative technique, not often encountered on a Parks Canada site. The glass is drawn lengthwise and twisted to form sections of

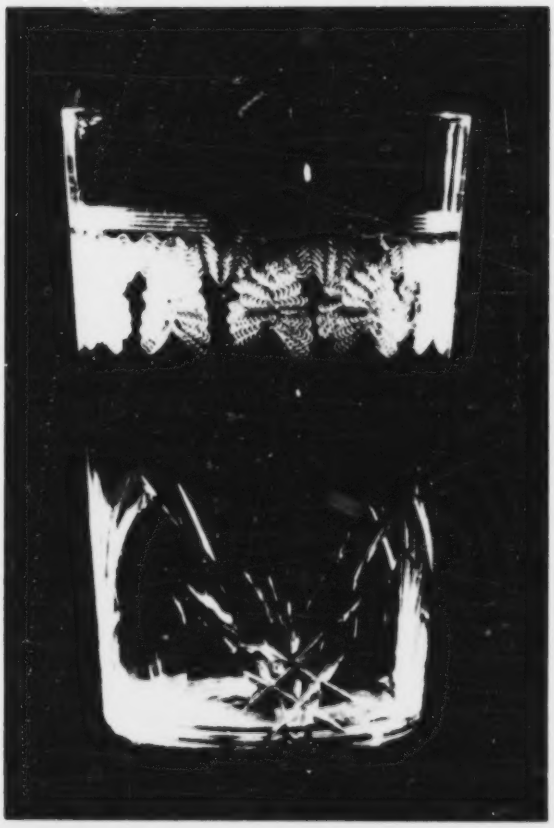


Figure 37. Glass tumbler with an acid-etched decoration around the top. The evenness of the elements of the design suggests that the pattern was incised using a template. The lower portion of the body has been decorated by cutting.

glass separated by pinched areas. Theoretically such a technique could appear on stemware items, on applied handles and neck rings, and could even be practiced on applied threading.

With Chemicals

ACID ETCHING

The glass surface of an object is completely coated with a compound, like wax, which is capable of resisting the action of hydrofluoric acid. A design is drawn on the object through the compound, and the acid is allowed to attack the exposed portions of glass. The object is washed and the resist removed. Different effects can be achieved by varying the type of acid: pure acid dissolves the glass, leaving the surface bright and clear; mixed with sulfuric acid it produces a gloss on lead glass unequalled by any mechanical polishing method; the addition of a neutralizing agent, such as ammonia, inhibits the dissolving of the glass but produces a frosted, obscured effect. For this reason, the technique is also called acid engraving, acid embossing, or frosting (Newman 1977: 109).

IRIDESCENT GLASS

A surface rainbow finish is produced by spraying hot glass with solutions containing chlorides or nitrates of such elements as tin, bismuth, iron, and antimony. This can be done either before or after annealing. Sold under a variety of names, including Carnival, Rainbow, Bronze, and Taffeta, iridescent glass was produced commercially in Europe, the United States, and England during the last third of the 19th century and into the 20th century. Do not confuse with patination which is caused by decomposition of the glass.

With Abrasives

DIAMOND POINT ENGRAVING

A design is either scratched or stippled onto the glass surface using a diamond point or other sharp implement. In scratching, the design is composed of scratched lines and can vary from primitive and crude to highly sophisticated, finely executed pictures. The lines are thinner and finer than those produced by copper wheel engraving.

Stippling is more delicate than scratching. The design is impressed on the glass by the point of the tool, in dots or very short lines (for illustrations of both types of diamond point engraving, see Norman 1972).

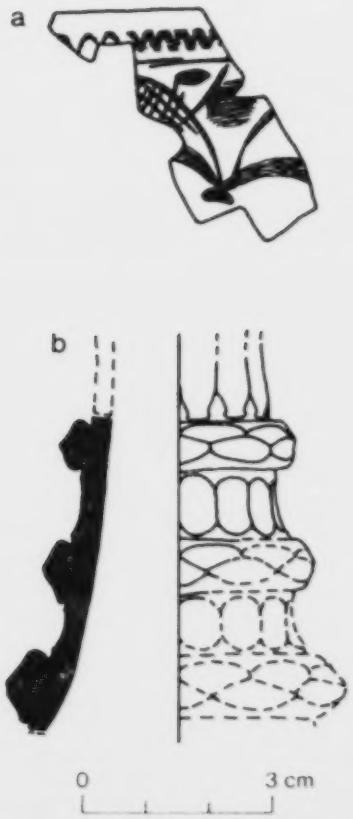


Figure 38. (a) A tumbler rim fragment with copper wheel engraved design. The individual strokes formed by the wheels are observable. (b) Decanter neck with three applied neck rings and cut facets on the neck and rings.

WHEEL ENGRAVING

Small wheels, usually of copper, are used with an abrasive to create designs or pictures in the surface of a glass object. Engraving causes the glass to be cut away, sometimes shallowly, sometimes more deeply. The engraved areas have a rough unpolished surface, greyish-white or frosted in appearance, although on finer wares some polishing may be done to highlight the design.

Engraving lends itself to naturalistic scenes, flowing curved lines and motifs, and inscriptions. On items in Parks Canada's collection the motifs tend to be simplistic and rather crudely executed, often used as border designs on tumblers although there are some examples of tableware with an overall design. The technique, however, is not limited to decorating but was also used to make labels on druggists' storage and display wares, for marking graduated measures, etc. A lapidary technique, wheel engraving on glass was revived in the late-16th and early-17th centuries. It received fresh impetus in the late-17th century with the development of the new potash-lime and potash-lead glasses, and continued in popularity throughout the 18th and 19th centuries.

In addition to shallow wheel engraving there are two other forms of surface wheel engraving. In relief engraving, excess glass around the design or picture is removed, sometimes using hydrofluoric acid, and the portion which remains projected above the surface of the object (i.e. in relief) is decorated by engraving. The technique is often called "cameo glass." An excellent example of this process is the Portland vase, where the overlay of white opaque glass has been differentially removed and the remaining portion engraved to form figures and scenes; this example is Roman.

Intaglio is the complete reverse of engraving in that the design is carved into the glass. Fine examples of intaglio were executed by the Bohemians in the 18th century.

CUTTING

Cut designs are produced on the glass surface using wet sand and a series of wheels. The process begins with iron wheels with flat, convex, or V-shaped edges for roughing the glass. Smoothing and grinding are next done, using finer sandstone wheels; these leave a dull matt finish on the glass surface which is then polished as the final step, either mechanically with wooden wheels, or chemically. Mechanical polishing produces the characteristic lustrous surface and retains the sharp edges of the cut strokes. Chemical polishing, a 20th century innovation, also produces a lustrous surface but tends to round the edges of the strokes.

Cut designs tend to be geometric, consisting most commonly of panels, flutes and mitres. Cut designs are often slightly uneven, e.g. panel heights may vary or the individual strokes making up a star motif may be of different lengths, although on very high quality, well-done pieces, these defects are minimal or non-existent.

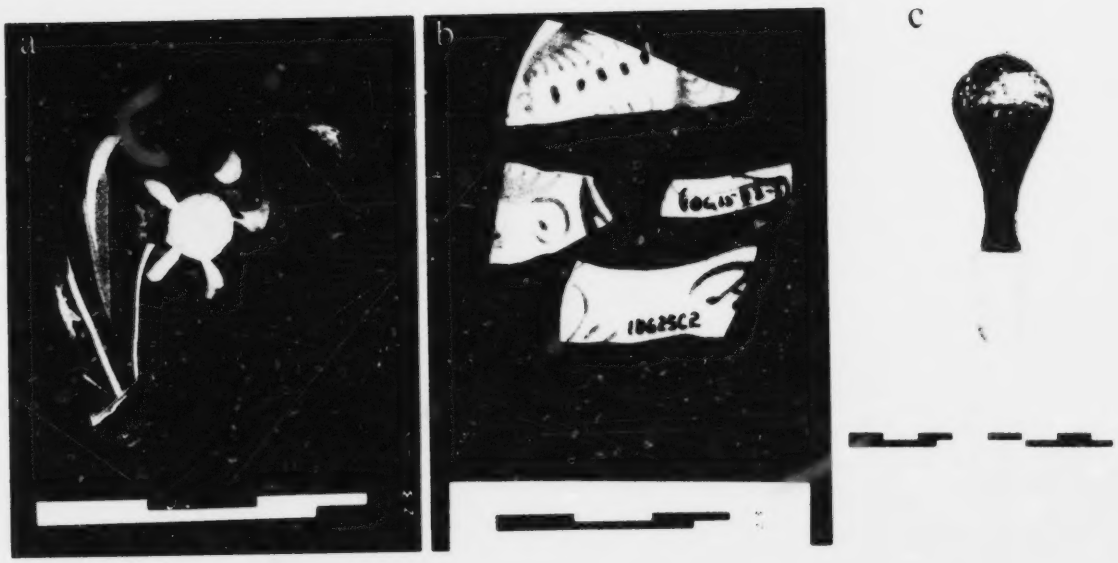


Figure 39. Decoration with adhesives. (a) A fragment, probably from a flask, with enamelled decoration in red, yellow, blue, and white. On several areas the enamelling no longer adheres to the glass. (b) Fragments of an opaque white object with an enamelled decoration in red. (c) Ball stopper with a long neck. The red staining on the finial and neck has begun to wear off.

SAND BLASTING

Invented in ca. 1870 in the United States (Newman 1977: 270), this treatment was only recently adapted to decorative uses. Grains of sand are directed by high air pressure from a portable "gun" across the glass surface. The result is a frosted, finely pitted finish, with a degree of depth. The technique has been used on large panels of glass and is not very common on Parks Canada sites.

With Adhesives

GILDING

A mixture containing gold was painted on the glass, then fired, and sometimes burnished with a stone. Gilding has a tendency to wear off.

ENAMELLING

Finely ground metallic oxide is made into paint with an oil base. The paints or enamels are applied to the glass surface and allowed to dry before the object is fired in a kiln. Firing burns off the oils and fuses the metallic oxides with the glass. Because different oxides fuse at different temperatures, it is necessary to have a sequence of firings if more than one colour of enamel is used. In that case the order of the decorating is started with the enamel that requires the highest temperature being fired first and that requiring the lowest temperature being fired last. The enamelled decoration is generally opaque or semi-opaque, and somewhat in relief.

PAINTING

Painting is generally a Germanic tradition. The paint is applied to the glass but not fired, so that it has a marked tendency to wear off. Painted designs are generally more transparent and smoother, but may be difficult to distinguish from enamelling.

STAINING

A thin transparent coat of colour (the stain) is applied to a colourless glass body with a brush, and then fired in a muffle to produce and fix the colour. Note that the colour is non-glassy and, unlike flashing or casing, can wear off, as it does not fuse with the glass.

SILVERING GLASS

In an English patent of 1848 (Revi 1959: 192) the interior surface of a hollow vessel or of a flat glass sheet is coated with silver nitrate; an American patent of 1869 uses a coating of lithage, with red lead and oil added to seal the silvering compound and protect it. The French and Bohemians were developing their own processes for producing the same effect, so ascription is difficult. The silvering mixture could also be put between the walls of a double-walled object. The technique was used to decorate witchballs, mirrors, doorknobs, and other vessels for table and decorative use, and is not commonly found on our archaeological sites.

COMMON DECORATIVE MOTIFS
(Figs. 40–51)

Flutes — Repeating pattern of distinct, concave units parallel to each other, either adjacent to each other or at short intervals.

Ribs — Repeating pattern of convex units parallel to each other.

Ribs/Flutes — Repeating pattern in which neither the concave nor convex units predominate.

Panels — These are generally flat, and divide a circular horizontal cross section into a six- or eight-sided one. The panels or sides are generally of consistent or repeating sizes.

Notches — A series of short nicks.

Hobnails — A group of bumps (square, circular, or diamond-shaped) rounded on top.

Fan — A fan shape.

Scallop — A round-topped design, usually on the rim of an object.

Facets — A facet is a hollow or flat cut of a particular shape (round, oval, ovoid, rectangular) and generally small.

Mitre — A mitre is a V-shaped groove.

Sawtooth — A pattern, usually repeating and often on the rim of an object, of pointed diamond-shaped bumps.

Cross-hatching — A series of lines crossing over each other. In glass, these are most commonly created by engraving.

Stippling — A series of small dots.

Starburst — Rays radiate from common centre, i.e. there is no centre facet.

Sunburst — Rays radiate from a common centre facet.

Diamonds — A diamond shape.

PATTERNS

Glassware can be decorated by press moulding, cutting, engraving, and so on. Generally only pressed patterns have been given names, although in the late-19th and 20th centuries some cut glass patterns are also named. Names and numbers for pressed patterns can be found in the voluminous collecting literature on pressed glass and in glassware catalogues. As the same or similar pattern can have several different names, cite the source used. The following publications illustrate many American and Canadian patterns: Innes 1976; Lee 1944, 1960, 1966; MacLaren 1968; Revi 1964; Stevens 1967; Thuro 1976. British pressed glass appears in Lattimore 1979; Morris 1978; Murray 1982.

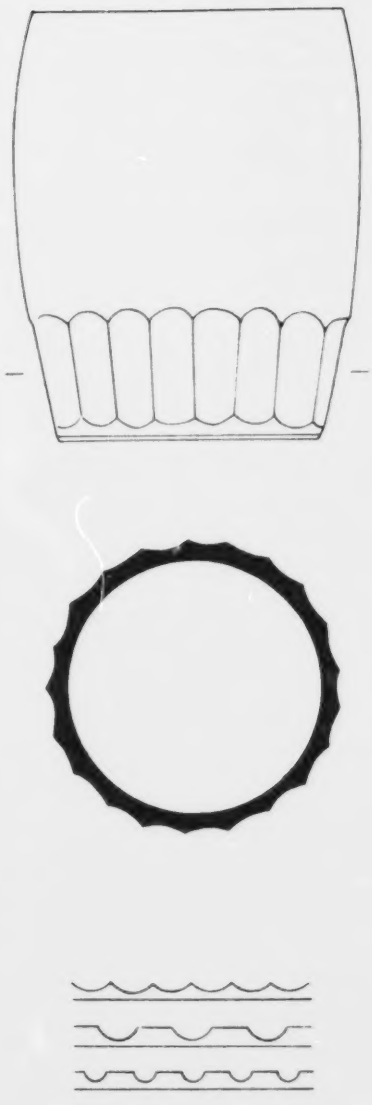


Figure 40. Common decorative motifs. Flutes.

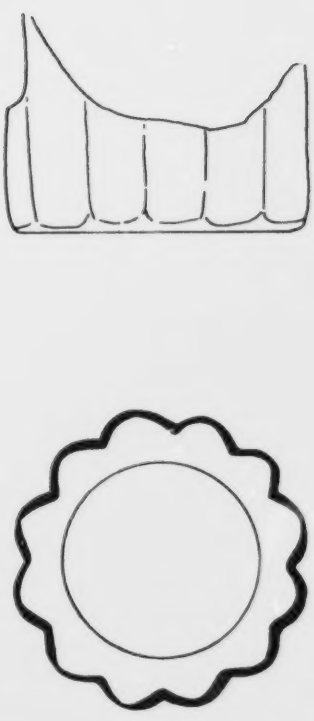


Figure 41. Common decorative motifs. Ribs.

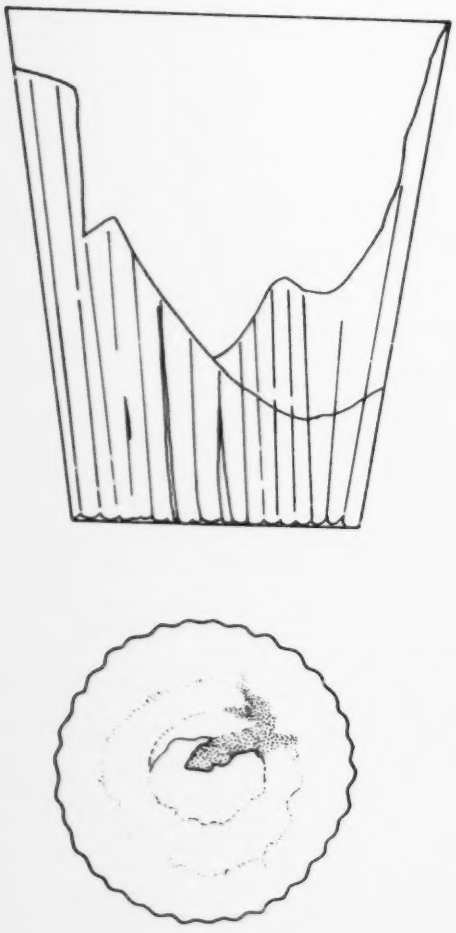


Figure 42. Common decorative motifs. Ribs/flutes.

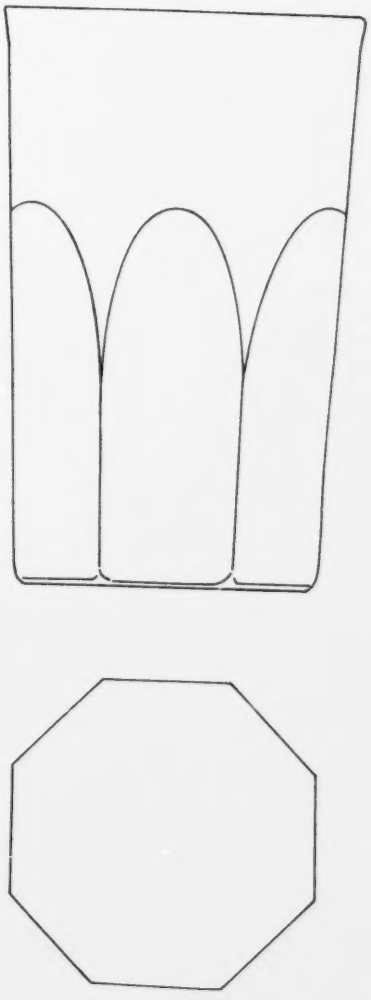


Figure 43. Common decorative motifs. Panels.

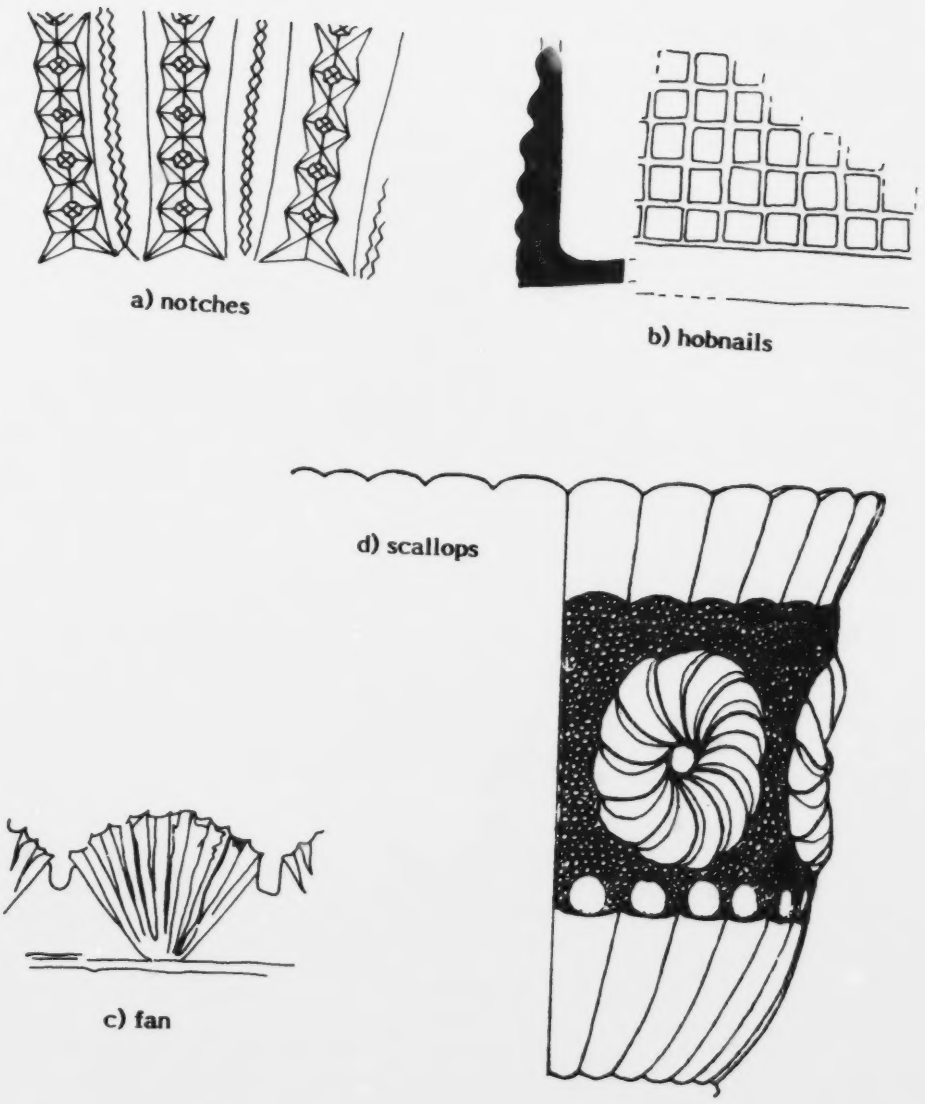


Figure 44. Common decorative motifs.

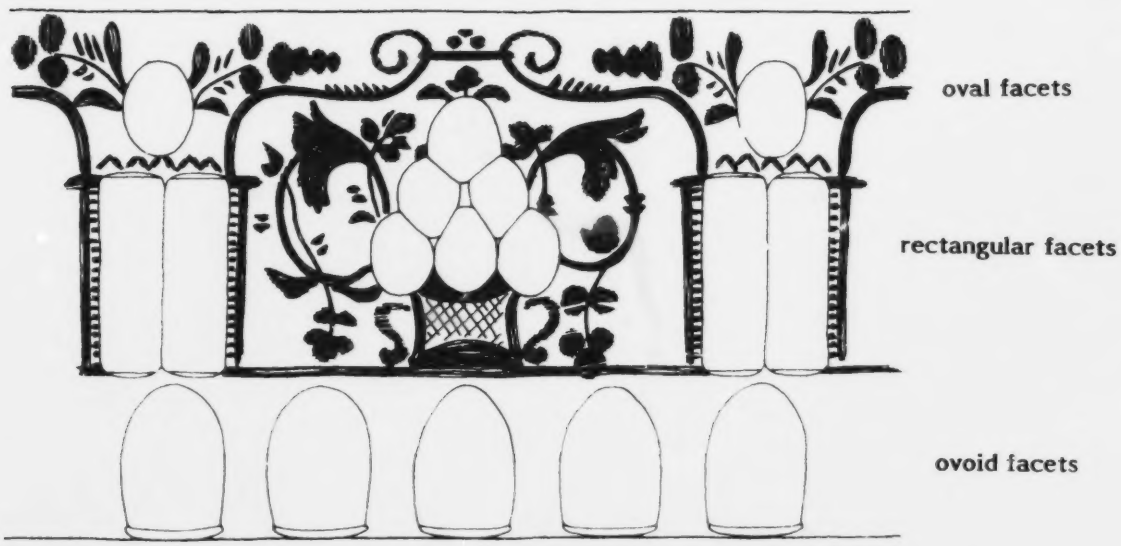


Figure 45. Common decorative motifs. Facets. This decoration is from a tumbler and consists of cut facets and engraved floral motifs.

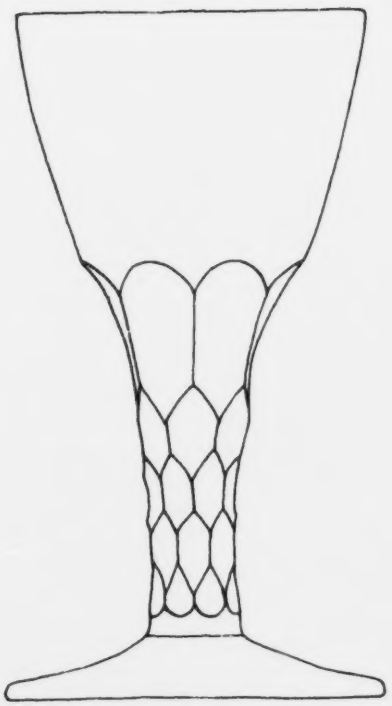
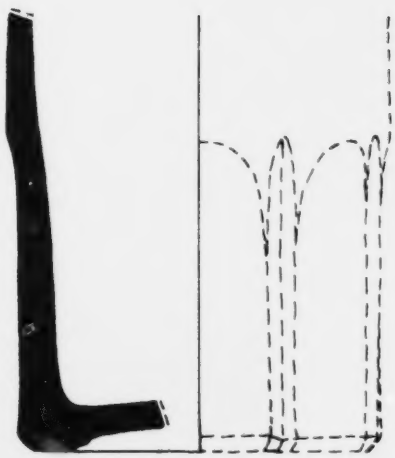


Figure 46. Common decorative motifs. Hexagonal cut facets on a stem.



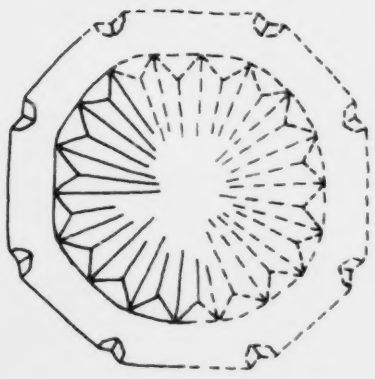
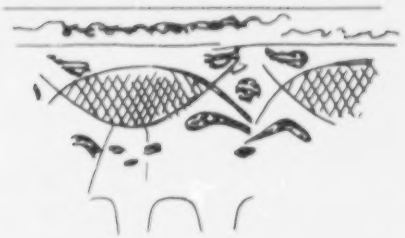
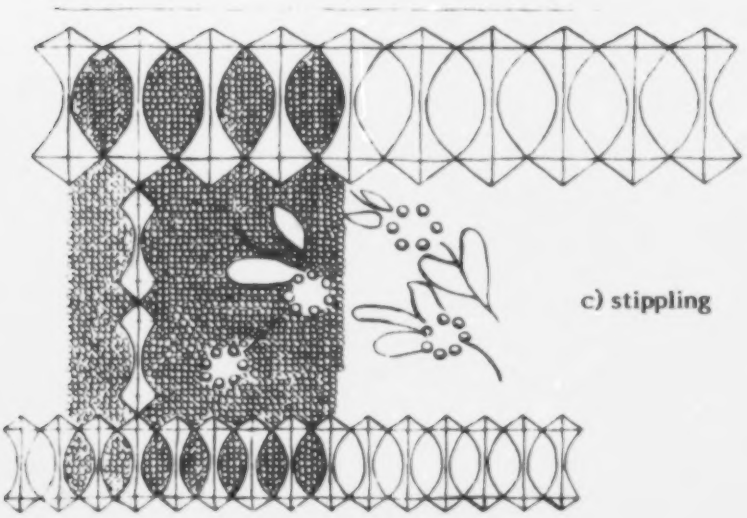


Figure 47. Common decorative motifs. Alternating panels and mitres.

a) sawtooth



b) cross-hatching



c) stippling

Figure 48. Common decorative motifs. (c) Stippling. This pattern is called "stippled forget-me-not" (Lee 1960: Pl. 128).

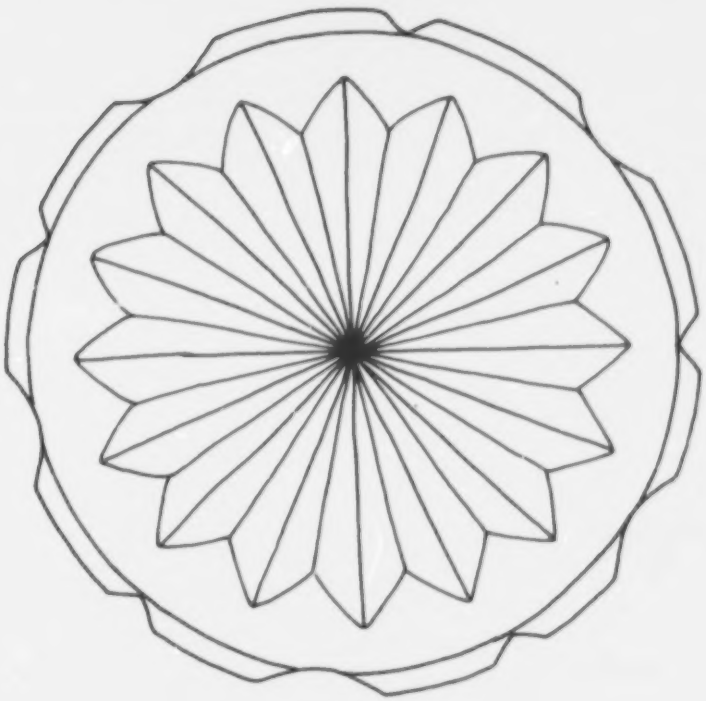


Figure 49. Common decorative motifs. Starburst.

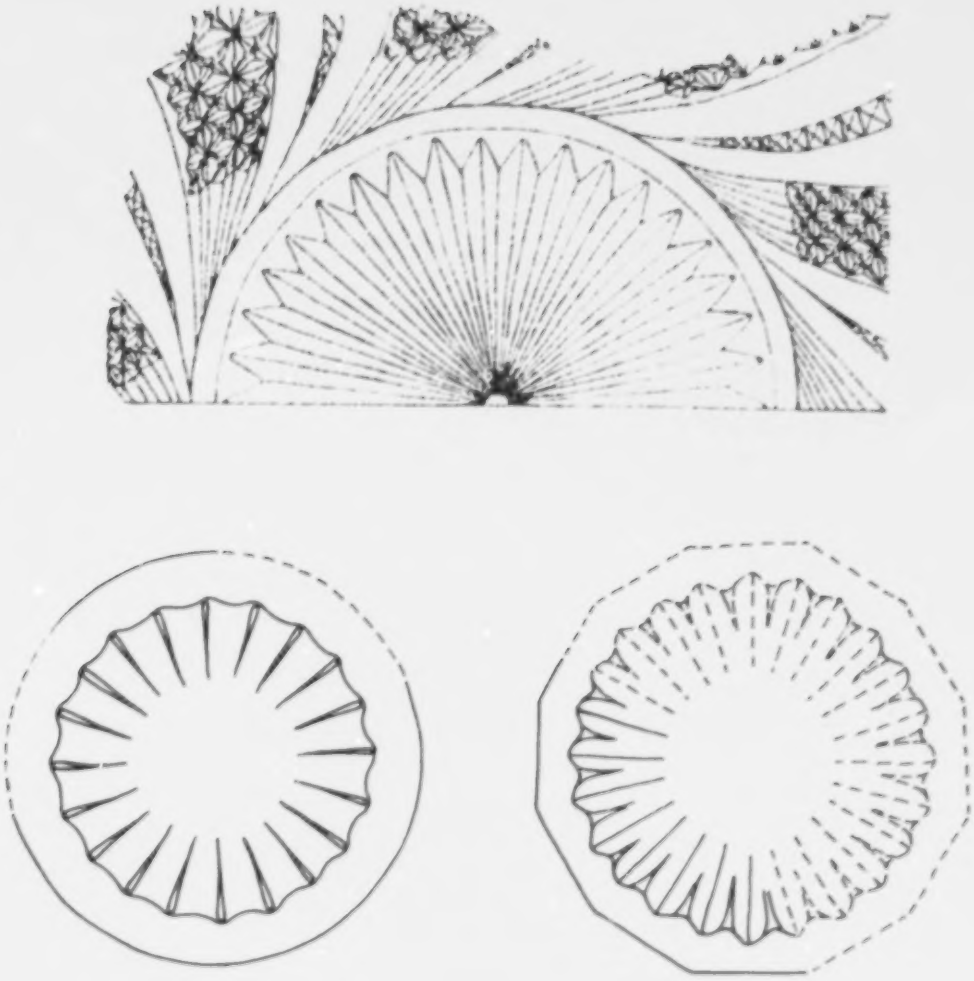


Figure 50. Common decorative motifs. Sunburst.

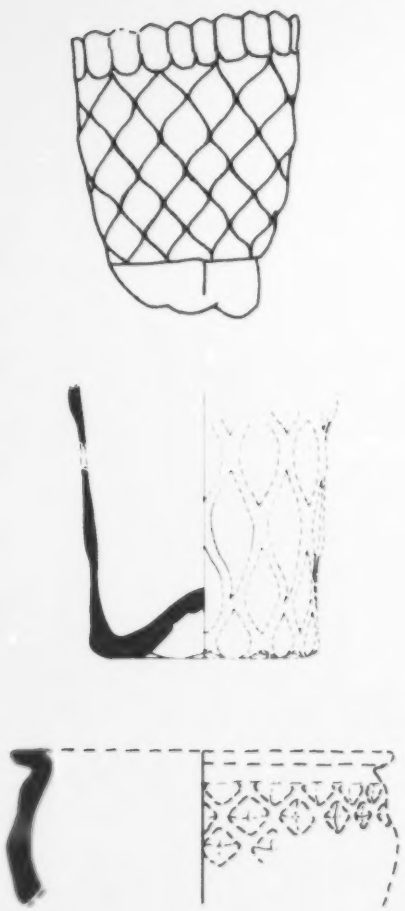


Figure 51. Common decorative motifs. Diamonds.

PART II. GLASS CONTAINERS

CATEGORY

Container — Container is a general term applied to glass bottles and jars (BSI 1962: No. 6201). Generally a bottle has a small mouth, but may have a comparatively wide mouth, and a long or at least a well-defined neck. A jar has a wider mouth, the diameter of which approaches that of the body, and usually has a non-existent or very short neck. The difference between the two is commonly understood.

SUBCATEGORY

Food — A bottle or jar sold prepackaged with food, sauces, spices, etc., or empty, with the intention that it be filled in the home and stored until required. This definition excludes nursing bottles.

Household — This subcategory is a rather large one, including bottled products whose function is maintenance and repair, e.g. waxes and polishes and oils for machines and home furnishings.

Inks/mucilage — This includes master ink bottles, fancy ink wells which were refilled in the home, and commercial containers sold holding ink. Mucilage bottles may be difficult to identify; ink-style commercial containers were often used to sell mucilage.

Liquor — A narrow-mouthed bottle whose colour, shape, and/or size are associated with the packaging and selling of alcoholic beverages.

Medicine — Bottles and jars of varying shapes and sizes used for storage, dispensing, and sale of medications.

Nursing — Bottles are usually easy to identify, their special function dictating features common to the majority of them. They would have been sold empty, and may be embossed.

Soft drink/mineral water — Bottles used to sell natural and artificial mineral water, soft drinks, or gingerbeers. Bottles often have special design features to deal with the internal pressure exerted by carbonation. "Blob" tops and rounded bases make this style of bottle, for some time periods, more easily distinguishable than other subcategories.

Toiletries — This includes bottles and jars sold containing cosmetics and perfumes, as well as fancy containers sold to have commercial products transferred to them.

Miscellaneous — This includes items which are identified but which do not fit in with the other functional styles, e.g. snuff.

Indefinite — This term is used as a subcategory for three distinct types of containers: 1. Containers known to have been used as multi-purpose containers for very different sorts of products, e.g. a machine-made gallon-size glass-eared packer (Putnam 1965: 173, 197). 2. Containers that could have been used for more than one function, commonly food or medicine. 3. Containers whose function could be identified if more of the artifact were present, e.g. flat octagonal bases in dark green glass, flanged or folded finishes, blue-green bubbled glass bases, and base fragments of light green glass cylindrical bottles.

Undiagnostic — These are fragments that have no potential for identification as they have no identifiable features beyond the fact that they were containers.

Unidentified — This is used for containers whose style does not suggest a known function, but which have a potential for identification. Although the overall shape is known the container is not recognized, or the embossing, decoration, or words may be distinctive but incomplete, or the shape is unusual.

Table 1. Category: Container

Subcategory	Article examples	Popular name
Food	Milk, essence of coffee, lime juice concentrate, extract, cheese jar, mustard, fruit jar, condiment, salt, sauce, olive oil, pickles, vacuum bottle, etc.	Thermos
Household	Blacking, furniture polish, wax, gluing, bleach, silver polish, machine oil, glue, etc.	
Inks/Mucilage	Ink well, ink bottle, master ink, mucilage (not glue), etc.	Umbrella ink
Liquor	Gin, beer, ale, wine, whiskey, brandy, etc.	"Wine," flask, case bottle
Medicine	Druggists' shapes, poison, patent or proprietary medicine, specimen jar, etc.	Vial, ampule
Nursing	Probably no further division	
Soft Drink/ Mineral water	Seltzer water, ginger ale, spa water, etc.	Egg, etc.
Toiletries	Perfume, cologne, cold cream, flower essence, hair oil, tooth powder, bath salts, hand lotion, barbers' bottles, etc.	
Miscellaneous	Snuff, imitation woad, etc.	
Indefinite	French blue-green bubbled, jug, demijohn, base of an octagonal bottle, etc.	French blue-green, bubbled, jug, demijohn
Undiagnostic		
Unidentified		

POPULAR NAME (MODEL)

Some types of glass containers have acquired widely recognized names from their use, contents, or shape. Because these terms often changed meaning over time and are used indiscriminately, some definitions are offered to aid in consistency of their use.

Ampule — A very small glass container designed to be filled, then sealed by fusion of the glass neck (Society of Glass Decorators 1968: 6).

Case bottle — A bottle with a square cross section, widening from base to shoulder, with a short neck and indented base, and usually in dark green glass. It was apparently designed to fit easily into a compartmented crate, box, or case.

Demijohn — A large, narrow-necked glass bottle having a capacity of 2-5 gallons (1 imperial gallon = 4.546 L). The body shape can be globular or cylindrical. As most archaeological specimens cannot be measured for capacity, the term demijohn can be used for all containers larger than a gallon.

Egg — The bottles referred to by this term have egg-shaped bodies with more or less pointed bases (Fig. 30c) and were used in the 19th century for artificial mineral waters and other carbonated beverages.

Flask – Originally designed as a travelling bottle, in section it has two flattened sides and approaches an oval (Fig. 72). Vertically, flasks come in a variety of shapes or decoration, e.g. violin, scroll, horseshoe, etc.

French blue-green bubbled – A short-hand term used to describe a group of wares produced in France in the 17th and 18th centuries (Fig. 6b). The glass is characterized by its colour, a distinctive blue-green, and by the presence of numerous seed bubbles. In Canada use of the term should be restricted to sites with French 18th century occupations. In addition to the glass itself, the container forms are also distinctive (see Harris 1979 for a discussion of these containers). Before using the term consider the site context and the container form being described.

Jug – A bottle with a short neck and a comparatively small handle attached near or on the lip and on the shoulder. Some jugs may have two handles.

Umbrella ink – A term used in collectors' literature to describe a conical, multi-sided ink bottle (Fig. 75). As with other terms of this nature its use should be specific to one particular group of containers and if the term is obscure, reference it.

Vial – A small, usually cylindrical container for holding liquid medicines, pills, etc. (Fig. 3b). For the purposes of this glossary a vial shoud not hold more than 6 ounces and the term generally implies use for medicinal purposes.

"Wine" bottle – This is a generic term to describe the dark green glass bottles with a circular cross section first developed in England in the mid-16th century. It is a very broadly applied term as it is used for everything from the globular-bodied long-necked versions of the mid-17th century, to the short-necked, onion-shaped bottles of the early-18th century, and the cylindrical versions that started to be produced in the mid-18th century and continue in use to the present (Figs. 3a, 10). In the 19th century it is more difficult to define the limits of the term. Certain variations in shape of shoulder and finish and in colour make the term inappropriate for some bottles. The bottle in question should have a two-part finish (i.e. a lip and string rim), an indented base, a roughly cylindrical body, a rounded well-defined shoulder, and a neck one-quarter to one-third of the total body height, and be dark green in colour.

MANUFACTURE: CONTAINERS

Most of the concepts in Table 2 are explained at length in Manufacturing Techniques in Part I. However some of the terms need a clarifying note on their application in the context of container manufacture; these are given below.

When the manufacturing technique of a glass container is described, it is recommended that the most specific term possible is used, a minimum number of terms be used (e.g. if a container has been dip moulded, it is unnecessary to say as well that it was "mouth blown" or "mould blown"), and the terms be used without further explanation, as they are well-defined.

Moulded – This is a general term used when it is known that the body was formed in a mould but the type of mould is not identifiable. The term can be used for mouth-blown, contact-moulded, machine-made, and pressed containers.

Mould blown – A general term used to indicate that the specific type of contact mould used to form the container cannot be identified.

Machine-made – Unless a specific study is being undertaken the term "machine made" is sufficient description of the manufacturing technique, and the method of base and finish formation is assumed.

Moulded base – This is a general term used when it is known that the base was formed in a mould but the type of base mould (i.e. separate base part, machine-made base part, or base as part of the bottle/body mould) cannot be determined.

Table 2. List of terms for container manufacture

Body/bottle

Mouth blown
or
Free blown
or
Machine-made
or
Cut body
or
Lampworked
or
Moulded — or Contact Moulded — or Dip mould
or 2-piece mould
or Ricketts-type
or 2-, 3-, or 4-piece vertical body
or Shoulder height multi-piece
or Turn/paste
and/or Vented mould
and/or Plate Mould

or Pattern moulded
or Optic moulded
or Press moulded

Base

Moulded base
or
Separate base part
and
Cut base

Empontilled (Blowpipe)
or
(Sand)
or
(Glass-tipped)
or
(Bare iron)
or
Possibly empontilled
or
Not empontilled
and
Pushup-forming mark

Finish

Cracked off
or
Moulded finish (general)
or
Mouth-blown moulded finish — or Burst-off or blow-over
or
Finishing tool
or
Fire polished
or
Ground
or
Manipulation of glass at the end of the neck
and/or
Added glass

Separate base part — We make no distinction, at this time, between cup and post bottom moulds; both are separate parts from the body/bottle forming mould. This term is used either alone when the type of body/bottle mould cannot be determined (e.g. mould blown, separate base part) or as a further definition of the type of body/bottle mould (e.g. two-piece body with separate base part).

Cut base — Various areas of the base may be roughly ground or cut and polished, including the whole basal surface, the resting surface, or the pontil mark.

Pushup-forming mark — In certain studies, it may be of interest to note the type of mark created by a pushup-forming tool. These marks can occur as depressions or as iron oxide deposits. Common shapes are pointed, quatrefoil, trifoil, circular dome, etc. (see Jones 1971).

Empontilled — The different types of empontilling techniques and marks are discussed extensively in Jones (1971). As it is frequently difficult to distinguish between the types, it is acceptable simply to note the presence of the pontil mark unless it is useful in the study being undertaken, e.g. in 18th century French and English contexts.

Possibly empontilled — In some instances, particularly in dark green glass liquor bottles of the mid-19th century, it is very difficult to decide if the bottle has or has not been empontilled.

Not empontilled — Use of this term indicates that enough of the base is present to determine that the object does not and never did have a pontil mark on its basal surface. It is not necessary to record this fact when the date of the site indicates that empontilling is rare.

Moulded finish — This is a general term used, for example, when the fragment of glass has a contact-moulded lug and could have been mouth-blown in a bottle mould or machine-made.

Mouth-blown moulded finish — A general term used when it cannot be determined whether the bottle mould used to make the finish was a burst-off or a blow-over mould.

Manipulation of glass at the end of the neck — This is a general term used to distinguish among lips formed from added glass, lips formed by cracking off and fire polishing or grinding, and lips formed by shaping the glass at the end of the neck. This latter technique varies in its interpretive importance. For lip forms normally made this way, such as flanged or folded lips, it is unimportant to note that this technique was used. For lips found on dark green glass English "wine" bottles of the ca. 1790-1820 period, the change from manipulation of glass already present to adding glass to form the lip has dating implications.

Added glass — When a string rim is present on a finish that has not been blown in a mould, the string rim has almost always been formed from added glass. Adding glass to form the lip as well as the string rim begins in the late-18th century on English "wine" bottles, and gradually becomes the accepted technique in the 19th century for all kinds of bottles, particularly those with finishes formed by finishing tools. The term "applied lip" is frequently found in bottle collecting literature, but it is so broadly used (see Tibbitts 1964: 3) that it is meaningless and it is used differently by different authors.

Concerning oneself with Manipulation of Glass and Added Glass is a matter of judgement, depending on the time periods and type of container involved, as well as the nature of the study being undertaken.

COMMERCIAL MARKS

Many glass containers have markings put on by glass manufacturers, wholesalers, or retailers. Commercial marks include company trademarks, product labels, and various kinds of display labels, but no matter how beautifully applied these are not considered to be decorative. The most common methods of

marking are listed below (for details see Commercial Marks in Part I).

When commercial marks are encountered in the cataloguing process, describe the type of marking and location, recite the text, and describe any symbols.

Embossed – Containers may have been manufactured in a mould that imparted embossed markings to the base, body, shoulder, or neck.

Paper label – One or more paper labels may be affixed to a container, on its body, shoulder, neck, or over its closure.

Applied colour label (ACL) – Baked on enamel colours that become an integral part of the glass. As a commercial marking it is found primarily on containers for soft drinks. The use of ACLs began commercially in the United States in 1934 (Riley 1958: 145, 267).

Acid etching – Commercial marks are made by treating the glass surface with hydrofluoric acid. This method of marking is encountered on containers and other objects related to druggists' goods.

Gilded – Not a common method of marking containers, gilded commercial marks are sometimes found on druggists' shop furniture and other display jars.

Engraved – Engraved commercial marks may appear on containers as labels and as graduations on druggists' goods.

Glass labels – These may appear cemented onto druggists' bottles.

Seals – A glass blob applied to the body, shoulder, or neck of a container may have been impressed with the mark of a person, king, company, product, and/or year.

PERSONALIZED MARKS

Occasionally containers with initials or other marks scratched onto the glass surface are recovered. These are not commercial marks, as they were not reproduced in quantity; they appear to have been made by the person who owned or used the bottle.

DECORATION: CONTAINERS

Generally decoration does not alter the form of the object but embellishes it. It is sometimes difficult to decide whether an attribute is form or decoration. The commonest type of decoration on containers is pictorial designs on the body. Ribs and flutes are considered decoration as are vertical panels.

Decorative container styles may be the trademark of a specific company (e.g. a Coca-Cola bottle) or may be associated with a specific product, such as a toiletry. Figural containers can also be considered to be decorated.

Monograms, labels, trademarks, and "set pieces" (e.g. mortar and pestles used on stock druggists' bottles, Fig. 30a) are considered commercial marks. The method of decoration, motifs, and location should all be described (for full explanation of decorative methods see Glassware Decoration in Part I; Table 4).

CONTAINER DESCRIPTIONS

Finish – The finish consists of the bore, lip, and string rim if there is one. Hence the finish can be one-part (lip only), two-part (lip and string rim), or three-part (lip, string rim, and a third element).

Bore – The opening at the top of the container, including any configurations inside the top of the neck.

Lip – The external, upper part of the finish.

String rim – A protruding ledge or ring near the top of the neck.

Neck – The narrowed portion of the container between the finish and the shoulder. Certain types of containers (jars, for example) do not ordinarily have a neck.

Shoulder – The widening part of a container that joins the neck or finish to the body.

Body – The main part of a container, used to enclose the contents.

Heel – The area at the bottom of a container, usually a curve or a corner, which joins the body to the resting point.

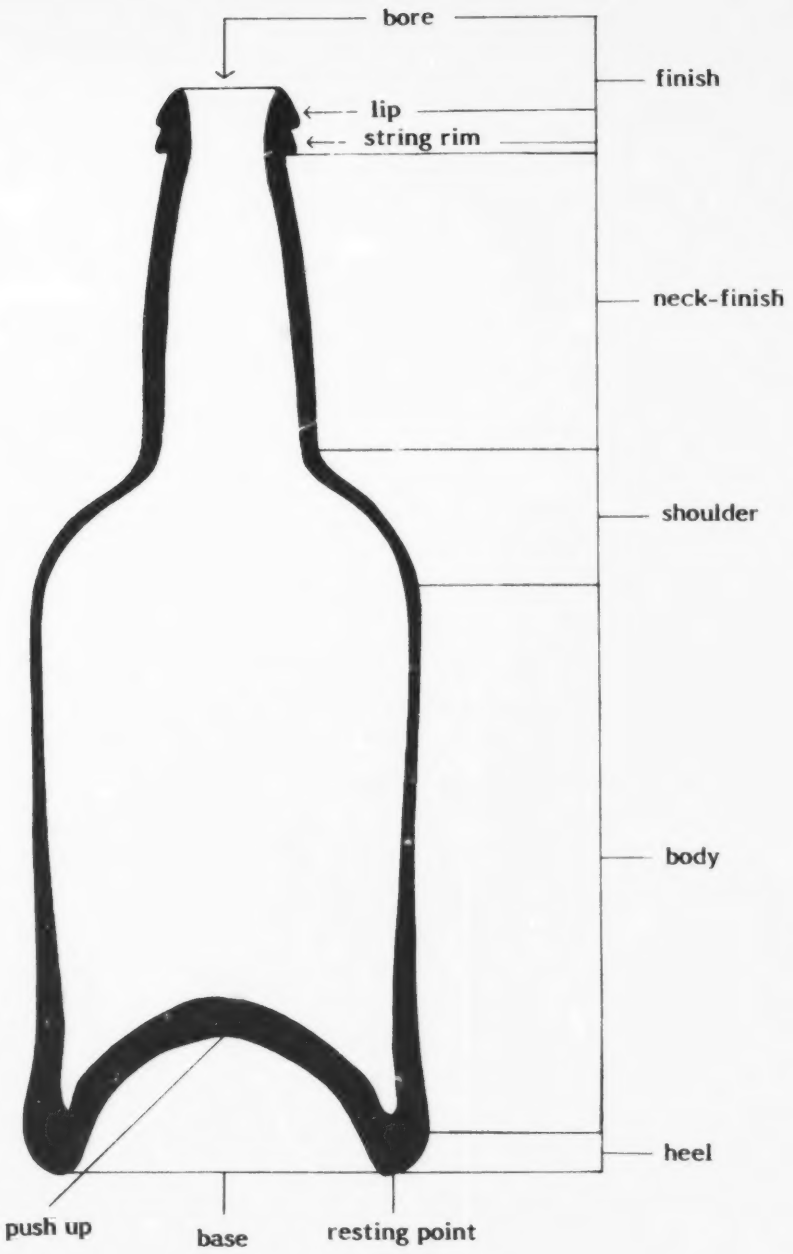


Figure 52. Bottle anatomy.

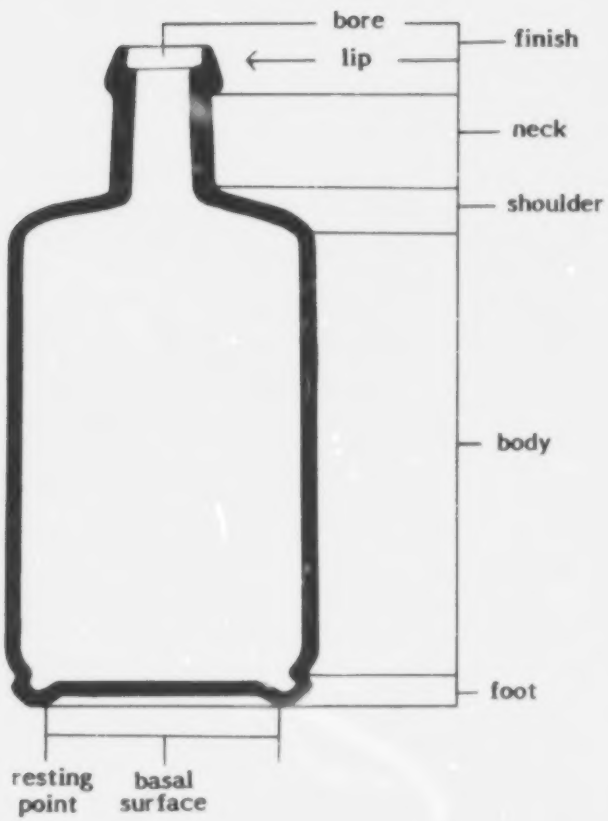


Figure 53. Bottle anatomy.

Resting point or surface — The portion of a container that rests on a surface when the container is standing upright.

Base — The base is the bottom of the container and the term is used to indicate the area inside the resting point.

Finish (Fig. 54)

The finish is the top part of the neck of a bottle or jar made to suit the cap, cork, or other closure (BSI 1962: No. 6302). In hand glassmaking it was the last part of the container to be shaped, hence the container was "finished," but in machine-made containers the finish is pressed into shape as part of the very first operation. The finish consists of the bore, lip, and string rim if there is one.

Glass factories in the late-19th and early-20th centuries produced a variety of finishes for their containers. Manufacturers' catalogues for this period commonly illustrate the types of finishes available separately from the bottles. Unfortunately the various manufacturers were not consistent in naming the various finishes. Therefore if terminology from a glassmaker's catalogue is used, be sure to cite that catalogue. Another problem with finish names is that some of them imply container contents. A good example is the "castor oil" finish, also used for liquor and cologne bottles. To distinguish the probable contents intended for a container, it is necessary to look at it as a complete unit and to take into consideration the overall shape, size, capacity, and colour, in addition to the finish.

For these reasons it is usually more convenient to describe the shape of the different finish elements than to research and reference each finish. However some finish forms are familiar under a specific name or were part of a closure patent with a known name, e.g. champagne, crown, club sauce, patent lip, prescription lip, and kork-n-seal.

Finishes can be formed by manipulating glass at the end of the neck, by shaping glass added to the end of the neck, by use of the finish-forming tool, or by being blown in a mould.

One-part finish — Used to distinguish finishes which consist of only a lip.

Two-part finish — Used to distinguish finishes with a lip and a string rim.

Three-part finish — Used to distinguish a finish that has a third element in addition to the lip and string rim.

COMMON FINISHES (Fig. 55)

Champagne — Is formed by a finishing tool and consists of a wide, flat string rim a few millimetres below a flat-topped or a downward-sloping lip. In spite of its name the champagne finish style is a common finish for all types of French wine and for hock wine bottles. This finish style has its origins in the finishes used on 18th century dark green glass "wine" bottles, but it is distinguished from them by its regularity (formed by the finishing tool) and by the form of the string rim.

Crown — The style of finish designed to take a crown closure. It can be formed by a finishing tool or by machine. Patented in the United States in 1892 (Lief 1965: 17), it is used extensively for beer, soft drink, and mineral water bottles. Although the form of the lower element ("string rim") may vary somewhat, it is unnecessary to describe the minute variations of this finish.

Club sauce — A three-part finish found on sauce bottles, such as Lea and Perrins Worcestershire Sauce, consisting of a short rounded lip, a longer down-tooled or flattened element, and a short rounded or down-tooled string rim. The finish generally has a "stopper finish" or cork seat in the bore.

Davis-type — A common two-part finish found primarily on late-19th and early-20th century patent and proprietary medicine bottles and occasionally on druggists' ware, toiletries, and extract bottles. The lip has a rounded profile with a rounded or flat top. Just below the lip the string rim is down-tooled, rounded, or V-shaped, although on some examples it is so poorly formed as to be barely discernible. The string rim is approximately half the height of the lip and occupies about one-third of the overall finish height. Lip diameter is only a few millimetres larger than the string rim. Because this type of finish is frequently found on Perry Davis Vegetable Painkiller bottles, it was decided to call it a "Davis-type."

Patent lip — This is a one-part finish used extensively on medicine and small-mouthed foods, such as extracts, in the 19th and 20th centuries. It consists of a narrow lip which is flat on top and flat on its side with a bevelled underside (Fig. 60).

Prescription lip — A one-part finish, used, as its name implies, on medicine bottles, in the 19th and 20th centuries. The narrow lip is flat on its side and the top slopes towards the bore (Fig. 60).

Bore (Fig. 56)

The bore is the opening at the top of the container, including any conformation of the inside surface of the finish. "Mouth" may also be used in a general way as in "wide-mouthed" or "narrow-mouthed" container.

Because of the wide variety of closures developed in the late-19th and early-20th centuries that required specialized features in the bore, no attempt has been made to describe all of these in this glossary. Only the more common bore configurations will be shown. Finishes with specialized bores may be called by the name of the closure provided a bibliographic reference is cited. An example would be a Twitchell Floating Ball stopper.

Occasionally markings caused by the manufacturing process may be found in the bore, such as the line marking the addition of glass to form the finish, or the edge of a folded-in lip.

Cap seat — The ledge just inside the bore that is designed to hold a cap or disc. Commonly found on milk bottles (American Ceramic Society 1948: 3).

Stopper finish or cork seat — A ledge partway down the bore to accommodate a glass stopper with its shank wrapped in cork. The ledge is intended to keep the cork from dropping down into the bottle when the stopper is removed. In most archaeological specimens the cork has dried and shrunk around the stopper so that when the stopper is removed, the cork is too.

Internal thread — A raised screw thread on the inside of the neck. It is designed to take a glass or composition stopper with matching threads. Patents featuring internal threads on containers began to appear in Great Britain in the 1840s.

Ground — The bore is ground to accommodate a glass stopper with a ground shank. In the final grinding process the two are ground together so that the stopper is individualized for a particular bottle.

Constricted — Sometimes there is a constriction in the bore, generally opposite the string rim. This feature is particularly common on 18th and early-19th century dark green glass English "wine" bottles and it is difficult to interpret. It may have helped keep the cork in place in the neck, or may simply have been an accident of manufacture.

Lip (Figs. 57-61)

The lip is the upper part of the finish, located next to the bore; it varies from a plain, cracked-off surface to a complex moulded form. For containers the word "rim" is not recommended.

For convenience the lip may be spoken of as having two parts, a top and a side. If it is the top that is being described, this should be made clear. Otherwise, unmodified shape terms refer to the side profile of the lip, e.g. down-tooled lip. For some finishes, such as are found on champagne bottles and 18th century dark green glass liquor bottles, only the top of the lip is present.

Flat top — Lip has a horizontal top.

Sloped top — The lip is flat but slopes downward and outward.

Straight finish — A general term used when the neck-finish profile is continuous. There is no string rim and no significant projection of the lip. Types of straight finish include cracked-off, fire-polished, folded-in, and blow-over lips; its most common occurrence is on 18th century French "blue-green" containers (Fig. 6b).

Cracked-off — To "crack-off" a container from the blowpipe, the glass near the blowpipe is scored with a wet file or other tool. This creates a localized thermal tension so that a sharp tap on the blowpipe detaches the glass object. The crack-off surface is flat and uneven, with sharp often jagged edges. The top of the neck is usually reheated slightly to relieve the thermal tension and this process smooths these jagged edges but does not significantly alter the crack-off surface. This type of lip is found on 18th century dark green glass English and French "wine" bottles, on 18th century French "blue-green" narrow-mouthed containers, and continues to appear in the 19th century.

Fire-polished — By re-exposing glass to sufficient heat the glass can be made smooth and glossy and sharp edges are rounded. For lips this results in the top of the lip being rounded and slightly thickened.

Burst-off — The top of the lip is rough and jagged (see Miscellaneous Manufacturing Processes).

Everted or flared — A slight widening of the top of the bore. This may make a flat-topped lip appear V-shaped. The flared or everted lip is not as severely flared as the flanged lip nor as vertical as the straight finish.

Flanged — The lip projects outward horizontally and may actually be sloped slightly. It is relatively thin. Flanged lips are formed by manipulating the glass at the end of the neck. Common on medicine vials and in use for much of the 18th and 19th centuries.

Folded-in and folded-out — The lip is folded back on itself to form an even rounded edge. It can be folded inwards or outwards and can then be tooled into other shapes, everted or flanged, or left as a straight

finish. The folded-in lip is found generally on vials and mustard bottles. It appears to be in use by the first decade of the 19th century, and to have gone out of fashion by the last quarter of the 19th century.

Ground lip – The top surface of the lip is ground (Fig. 61).

Down-tooled – Profile of the side of the lip slopes outward and downward. It may be straight or slightly curved.

Flattened – Profile of the side of the lip is flat.

Tapered down – Profile of the side of the lip slopes inward from the top of the lip to the neck.

Rounded – Profile of the side of the lip is rounded.

V-tooled – The upper and lower surfaces have been tooled to give a V-shaped profile.

V-shaped – The profile is V-shaped but was not necessarily V-tooled. It is only important to make this distinction on 18th century dark green glass English "wine" bottles. For finishes formed by a finishing tool, "V-shaped" can be used.

Prescription – Top of the lip slopes down towards the bore, the side slopes down and slightly inwards, and the bottom slopes slightly downwards and sharply inwards (Whitall Tatum & Co. 1876: 4; 1919: 12). The upper edge of the lip is suitable for dropping. Generally found on medicine bottles of the late-19th and early-20th centuries.

Patent lip – Flat on top, flat on sides. Generally found on medicine or extract bottles of the late-19th and early-20th centuries.

Pouring lip – Alteration of a lip form to make a beak for pouring liquids. Frequently found on large ink bottles of the late-19th and early-20th centuries.

Threaded lip – A continuous projection, or series of projections, designed to hold a closure by twisting or screwing it into place, the threaded lip was an uncommon feature on containers before patents for making external threads were taken out in the United States beginning in the mid-1850s. Mouth-blown examples are frequently found with the top of the lip ground. A complex type of finish and one of the most frequently used on modern machine-made containers.

Continuous thread – A continuous spiral projecting glass ridge on the finish of a container, intended to mesh with the thread of a screw-type closure (Lief 1965: 26-29, 45). The thread usually circumscribes the bottle one to two times.

Interrupted thread – Threads on the finish of glass containers that are not continuous, having gaps at seam areas to avoid scratching coatings on closures (Lief 1965: 46).

Lug – A glass finish with a number of short raised threads on the outside of the neck (Moody 1963: 301). Two to four lugs are generally found. A brake or stop may be provided at one end of each lug.

String Rim (Figs. 62, 63)

The string rim is the ledge or ring that protrudes from the neck just under the lip. In hand manufacture it is generally formed from added glass but it may also be formed in the mould.

Although a similar feature to the string rim is found on machine-made containers, the term is not really suitable to use for them, particularly for containers with a threaded lip (see Bead, below).

Rounded trail or untooled laid-on-ring – The string rim is formed by rotating the container while a thin stream of glass flows from a small gather on a pontil. This type of string rim is basically unshaped.

Down-tooled – The string rim profile slopes outward and downward.

Up-tooled – The lower surface of the string rim is tooled upwards and outwards with a flat or rounded top.

V-tooled – The string rim has been tooled on its upper and lower surface into a V-shape.

V-shaped – The profile resembles a V-shape but was not V-tooled. It is only important to make this distinction between V-shaped and V-tooled on 18th century dark green glass "wine" bottles. On 19th century bottles with finishes formed by finishing tools "V-shaped" can be used.

Flattened – The side of the string rim is flattened.

Rounded – The string rim has a tooled rounded profile.

Rounded with flattened top and bottom – A protuberant string rim found on 18th century French "wine" bottles.

Decorated – Occasionally the string rim may be decorated with tooled or incised ribs. European spa water bottles often had this feature.

Bead – On machine-made containers with threaded lips the feature occupying the position of string rim is referred to as the "bead" (Fig. 63; see Moody 1963: 11). The "bead" can serve two functions, i.e. as a sealing surface or as a place to grasp the jar during the manufacturing process to minimize the danger of distorting the finish (Toulouse 1969b: 394).

Neck

The neck is the narrowed portion of a container between the finish and the shoulder (BSI 1962: No. 6301).

SHAPES (Fig. 64)

Tapered – The neck decreases in diameter from the base of the neck to the finish.

Cylindrical – The neck maintains a constant diameter from its base to the finish.

Roughly cylindrical – The neck maintains, more or less, the appearance of a constant diameter from its base to its finish, although the diameter may in fact vary from one part to another. These irregularities can be expected from hand-manufactured bottles.

Bulged – A deliberate bulge in the centre of the neck or towards the base. A bulged neck should not be confused with either a ball neck or neck rings.

Tapered down – The neck gradually expands in diameter from the base of the neck to the finish. This feature is most common on 18th century "blue-green bubbled" French containers.

Rudimentary – The neck is so short as to be almost non-existent. Basically the rudimentary neck is a brief constriction between the shoulder and the finish. This type is found most frequently on snuff bottles and on some case bottles.

Non-existent – There is no connecting constriction between the finish and shoulder or between the finish and body.

NECK TREATMENTS (Fig. 65)

Ball neck – A single ring encircling the middle or lower portion of the neck of a container, usually a recessed panel bottle. This ring is not a part of the finish and is usually formed in a mould.

Neck ring – Two or more rings, separate from the finish, encircle the neck in a single group or in a series. Generally they are formed in the mould; however, as with decanters, neck rings could be made by adding glass to the neck. In the latter case specific mention should be made of this addition (i.e. "applied neck rings"). Location and number of rings should be recorded.

Marks – Markings may occur on the neck although this is an infrequent occurrence. Type of marking, orientation, and location should be recorded. The illustrated example (Fig. 65d) has an embossed name encircling the base of the neck.

Ground – The exterior surface of the upper part of the neck may be ground. This is usually done to accommodate a closure or fitment which is attached to the outer surface of the neck.

Shoulder

The shoulder is the widening part of a container which joins the neck or finish to the body (Toulouse 1969a: 527).

FORMS (Fig. 66)

Rounded — The most common shoulder form, a hemispherical shape.

Sloped down — A gentle slope outwards and downwards from the base of the neck to the junction with the body. Generally a straight slope but it may have a slight curve.

Champagne — An elongated, tapered shoulder as found on champagne-style bottles. There is no distinct neck-shoulder junction.

Horizontal — The shoulder forms a roughly 90° angle with the body but will usually be slightly rounded at the body-shoulder junction. This shape is usually found on non-cylindrical bottles.

Scooped — The shoulder slope is concave.

Non-existent — There is no connecting area between the body and the neck or between the body and the finish. Many jars do not have shoulders (see Fig. 64).

SHOULDER TREATMENTS (Fig. 67)

Marks — Markings may occur on the shoulder. Type of marking, orientation, and location should be recorded. The illustrated example is embossed.

Decoration — Shoulders may be decorated, flutes or panels being the most common form of decoration.

Stepped — Horizontal "steps" encircling the shoulder.

Grooved — Treatment sometimes found on ink bottles, the shoulder is horizontal and has two or more grooves designed to hold a pen. The illustrated example (Fig. 67) has flattened areas at the four corners as well as the four grooves.

Body Shape

The body is the main part of a container, enclosing the contents (Toulouse 1969a: 527).

In describing the body three perspectives are considered: horizontal plane, vertical plane, and overall view. It may not always be necessary to describe all three perspectives but the cataloguer and researcher should be aware of which one they are considering.

Body horizontal — Profile of the horizontal plane near a midsection of the body. Containers are usually described primarily by their horizontal body cross section and this profile is thus the first aspect of the container body to be considered. There are innumerable variations and the most common forms are illustrated (Figs. 68-72) as guidance for the type of terminology to use.

Body vertical — Profile of the vertical plane of the body with the "front" (the side of greatest dimension) in full view.

Body general — Discussion of general body features would include markings, decoration, as well as terms that describe the three-dimensional form of the body, e.g. when the body vertical is "straight," and the body horizontal is "circular," the three-dimensional term "cylindrical" is more evocative of the bottle shape. If the researcher chooses to use container names found in trade catalogues the name should be considered as a body general term. Bibliographic references should be cited as different companies would produce bottles of very similar appearance and call them by different names.

BODY HORIZONTAL (Figs. 68-72)

Circular or round — All radii along a horizontal plane of the body should be of equal length.

Ovoid — A general term used when the sides of the body are curved but are not round and do not have angled corners. In druggists' catalogues of the late-19th and early-20th centuries the term "oval" is used for a variety of body shapes, many of them not oval or ovoid at all; generally the true shape should be described.

Kidney — Bodies which are ovoid in shape but one of the longer sides is concave in relation to the rest of the body.

Round with flat side(s) — The majority of the body is round but there are one or more flattened sides to it.

Ovoid with flat side(s) — The body is ovoid with one or more flat sides.

Square — All four sides of the body are of equal length; intersections of the projected sides are at right angles to each other.

Rectangular — A four-sided body having opposite sides parallel and of equal length. Projected sides are at right angles to each other.

Octagonal — An eight-sided body. True octagonal has eight sides of equal length. Flat octagonal has two long sides of equal length and parallel to each other and six short sides of equal length.

Triangular — A three-sided body.

5-sided, 6-sided, 10-sided, 12-sided, etc. — Body with multi-sides of equal length. (Not illustrated.)

Flask — A modified rectangle, usually with two flat, parallel sides and both ends rounded. The form may be confused with the ovoid body; however the flask is a commonly understood shape which is usually associated with alcoholic beverages. The body vertical profile varies considerably depending on the time period. In the late-19th and early-20th centuries many of the variations are named (e.g. shoofly, picnic, book, warrented).

Chamfered corners — Bottles with flat-sided bodies may have the corners chamfered or bevelled. The chamfered corners must be shorter than the sides. If the angled corner is equal to or greater in length than any of the sides of the body (as in a flat octagonal), the angled plane is considered a side. When the chamfer is flat the term "chamfer" is used. When the chamfer is a groove, however, the term "concave chamfer" should be used to distinguish a hollowed from the flat variety.

Strapped — Term used to describe the raised moulded bands of glass oriented vertically (from base-body to neck-shoulder junctures) along the short curved sides of ovoid bodies. Two commonly occurring bottles with this feature are the "Union oval" and the "Warrented flask."

Recessed panels — Indented areas on a body, generally rectangular with arched tops, often referred to as "panelled bottles" in collecting literature. If the total number of panels on a body is known, indicate the number as follows: two recessed panels, three recessed panels, etc. If only part of a side is recessed as in the front of the Perry Davis Vegetable Painkiller bottle, then the term "partial" can be used. Unless the bottle is extremely well-known it is unwise to extrapolate or infer the total number of recessed panels if the complete horizontal plane is not present.

BODY VERTICAL (Figs. 73, 74)

Straight — Viewing the vertical body profile, the sides are parallel to each other and the vertical axis.

Tapered up — Straight sides with the greatest body dimension at the base.

Tapered — Straight sides with the greatest body dimension at the shoulder.

Round — Viewing the vertical body profile, the body is round.

Ovoid — Viewing the vertical body profile, the body is ovoid.

BODY GENERAL (Figs. 75, 76)

Three-dimensional Shapes

Cylindrical — The body area is of equal diameter from the body-shoulder junction to the body-base junction. Roughly cylindrical can be used for bottles which have irregularities caused by hand manufacture. Tapered cylinder can be used for bottles such as dark green glass English "wine" bottles which have a slight taper to the body, the largest diameter being at the shoulder.

Conical — The body area suggests a cone. The greatest diameter of the body will be at the base-body junction. The body should show extreme tapering to be classified as conical.

Barrel — The body vertical is ovoid with the curvature climaxing at midsection; the body horizontal is round.

Spherical — Three-dimensional ball shape.

Globular — An irregular sphere, commonly found on early-18th century English "wine" bottles.

Egg — Body is ovoid in body vertical and round in body horizontal. The egg shape should include a round or pointed base. Commonly found in soft drink or mineral water bottles.

Figural — The overall shape of the body and/or the surface markings suggest an object, an animal, or a human, such as a slipper, a fiddle, a fish, Santa Claus, etc. Name the figure represented.

Philadelphia oval — An exception to the general recommendation not to use trade catalogue names for descriptive terminology. In most late-19th and early-20th century druggists' catalogues of United States and Canadian companies, the Philadelphia oval was a commonly recognized form. In horizontal section it is ovoid with one flat side (see Fig. 68) and is straight-sided vertically (Fig. 30b).

Surface Features

Marked — All types of commercial marks (embossing, paper labels, acid etching, etc.) should be described.

Decorated — The body may be decorated by embossed designs such as Masonic emblems, sunbursts, swans, etc. Such things as panels are considered decoration when they extend only partway up the body; panels that go all the way up the body change the body shape and are not considered to be decoration. All types of decoration (embossed, acid etched, cut, etc.) should be described.

Graduated — Containers that are marked with one or more divisions for measuring purposes (BSI 1962: No. 6421). These may be moulded, engraved, acid etched, or painted on.

Fragments

When body sherds are to be described and it is impossible to determine the intended body shape, the terms "flat" or "curved" should be used.

Heel (Fig. 77)

The heel is the area of a container that includes the curve, or corner, that joins the body to the resting point (Toulouse 1969a: 527).

Bulged — A rounded bulge in the heel area which can be a deliberate shape or can be an accident of the manufacturing process. Examples of deliberately shaped bulges are found on olive oil bottles of the late-19th century (Fig. 73). The unintentionally bulged heels, which used to be called "basal sag," are characteristic of English "wine" bottles dating from ca. 1740 to the 1820s, but other forms of bottles may also exhibit this feature. The bulged heel is a different shape from the footed base, and the two should not be confused.

Abrupt — The base-body junction is distinct, the straight sides of the body turn abruptly to the resting point.

Rounded — The heel is a gentle curve from the body to the resting point.

Chamfered — The heel, which would normally be abrupt, is beveled. The chamfered heel dates from the second half of the 19th century into the 20th century.

Footed — See Footed Base.

Insweep — An inward curved or tapered portion of a glass container that joins the lower part of the sides to the base (B.S.I 1962: No. 6313). This is a feature found on modern bottles and is designed to strengthen the Murgatroyd belt, the area

of a container that receives the greatest thermal shock (Wyatt 1966: 22).

Non-existent – Containers that do not have a resting point do not have a heel. An example of this type of container would be an egg-shaped mineral water bottle.

Marked – Occasionally commercial markings are found on the heel. This is usually a 20th century feature.

Decorated – Occasionally the heel is decorated.

Resting Point/Surface (Fig. 78)

The resting point or resting surface is that part that rests on a surface when the container is standing upright. The contact may or may not be continuous. In most cases it is unnecessary to comment on the resting point/surface but the following features may be noted.

Rocker – An imperfection, a container with an accidentally deformed bottom so it does not stand solidly (American Ceramic Society 1948: 9). (Not illustrated.) This is a common problem with dark green glass "wine" bottles of the 18th and early-19th centuries.

Four-point – Found on case bottles in which the four corners of the bottle are the only points on which the bottle stands. The heel arches slightly between these four points.

Flat – A distinct flattened area that serves as the resting surface. This area will vary in width and has usually been formed by moulding. The outer shape will follow the body horizontal but the inner contour may vary from it. Some flat resting points may be ground and polished by cutting (italics).

Mould line – In some containers the mould line may form the resting point. (Not illustrated.)

Marked – Embossed lettering around the perimeter of the base may form the resting surface.

Stippled – A deliberate surface effect found on machine-made containers, consisting of a regular pattern of slightly raised "pimples."

Completely flat – When the base is completely flat, the whole base becomes the resting point.

Base (Fig. 79)

The base is the bottom of a container, and the term is used to indicate the area inside the resting point and particularly the basal profile. Sometimes, however, it is more convenient to consider the heel and resting point as part of the base, as when measuring base dimensions and for containers with a "footed base."

Basal surface – The area inside the resting point, including the pushup or moulded indentation and the pontil mark.

Basal profile – Describes the exterior profile of the basal surface. Most bases are indented but some may be flat or even convex.

Indented base – A general term used to describe a basal surface that is pushed up into the interior of a container.

Pushup – When the basal indentation is deep, it is referred to as a pushup. The term is not suitable for bases with a slight indentation.

Footed base – A deliberate projection, usually sharply angled, at the base of the body, the foot forms a stand for the container. Generally found on bottles of the second half of the 19th and the 20th centuries.

Pontil mark – The scar or mark left on the base of glassware after the removal of the pontil. Different types of empontilling techniques leave different types of pontil marks (see Jones 1971: 62-73). The type and size of the mark may be useful in determining country of origin for dark green glass liquor bottles (described in Manufacturing Techniques in Part I).

Pushup mark — Mark or marks left by tools used to form the pushup. These marks occur as impressions, raised areas, or areas with iron oxide or other deposits. Unless one is doing a particular study it is not necessary to describe these marks (see Jones 1971: 62-73) (described in Manufacturing Techniques in Part I).

Marks — Embossed markings may be found on the basal surface. These should be described or illustrated. They are usually packaging or glass company names or markings, or are associated with the capacity of the container (see Toulouse 1971).

Decorated — Embossed or impressed decorations are occasionally found on the basal surface. These should be described or illustrated.

Mamelon — A rounded eminence, a small circular protrusion found on the basal surface, usually in the tip of the pushup. These may be a type of vent mark (Peligot 1877: 304-5). On champagne bottles the mamelon is large and protuberant.

Slugged bottom — Internal glass distribution in the base of the container is extremely uneven (BSI 1962: No. 7434). This problem is very common on mid-19th century dark green glass liquor bottles and appears to be related to the working properties of the glass in combination with the moulding technique. This feature is generally of interest only for manufacturing studies.

BASAL PROFILES (Figs. 80-82)

Basal profiles come in many varieties, including the following: conical, rounded cone, dome, parabolic, bell-shaped, flat indentation, flat, shallow concave, and convex.

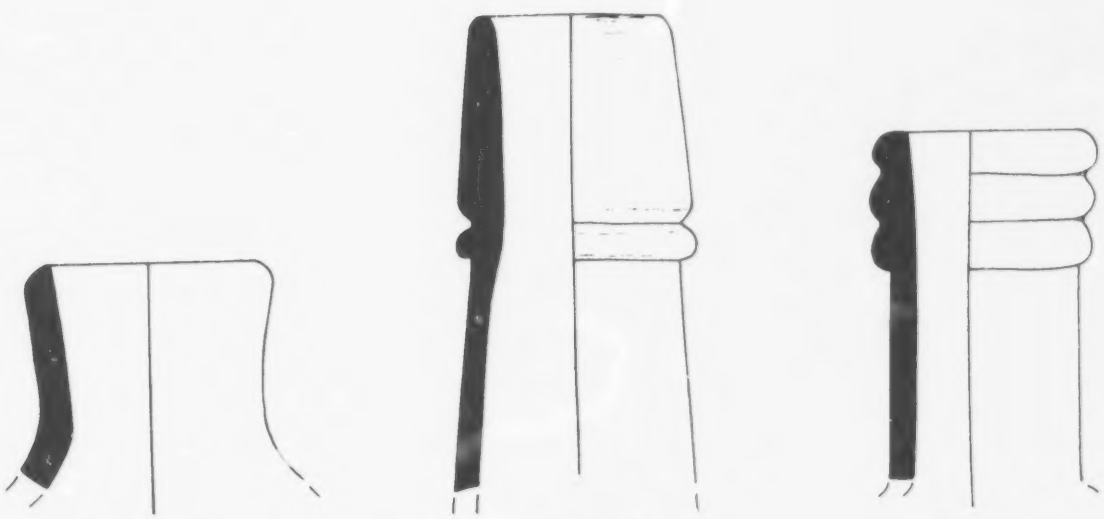
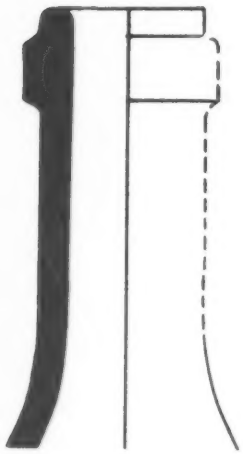
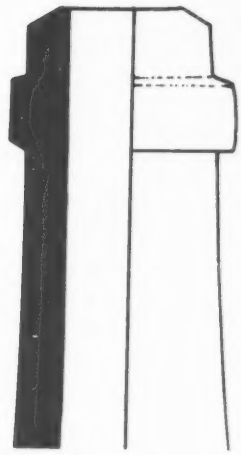


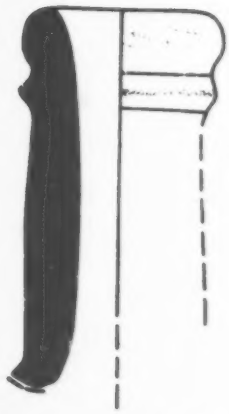
Figure 54. Finishes.



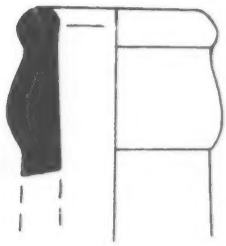
a) champagne, flat top



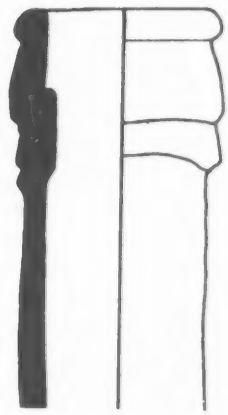
b) champagne, sloped top



c) Perry Davis type



d) crown



e) club sauce

Figure 55. Common finishes.

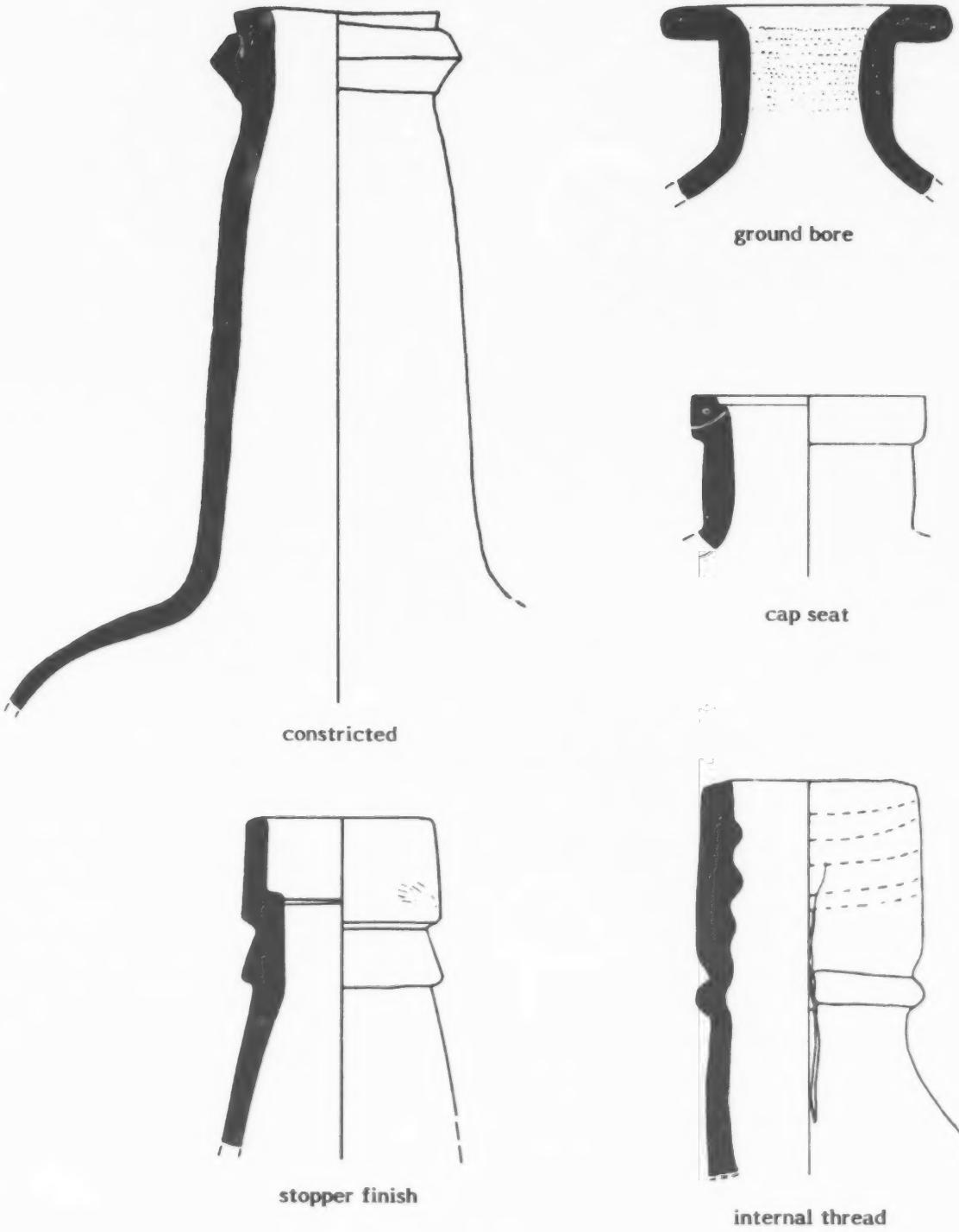


Figure 56. Bores.

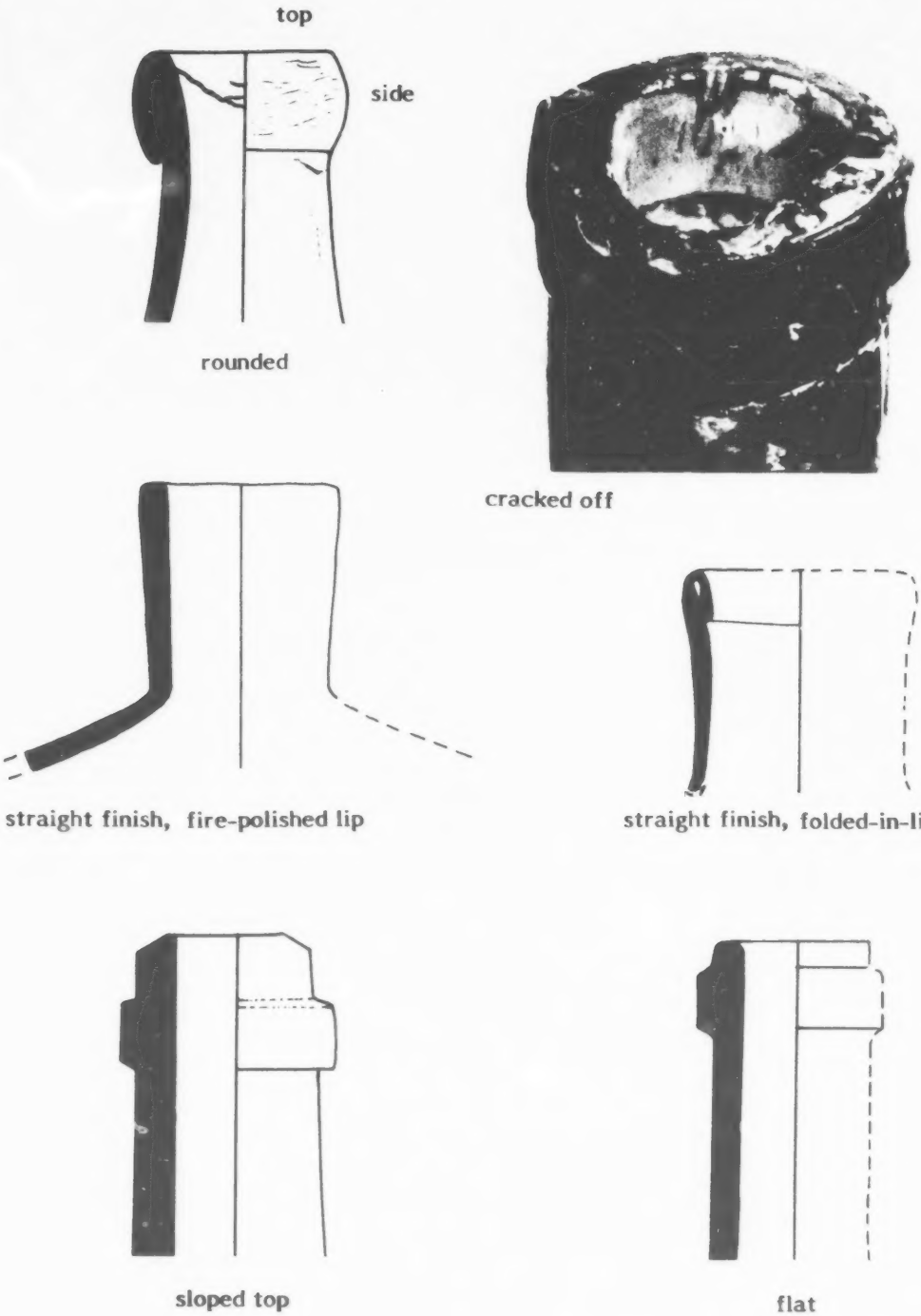
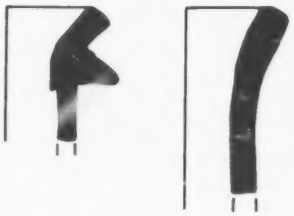
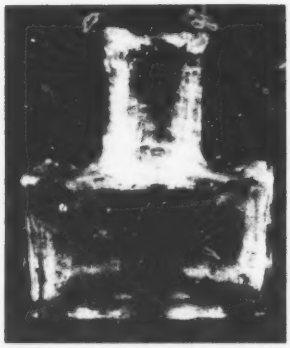


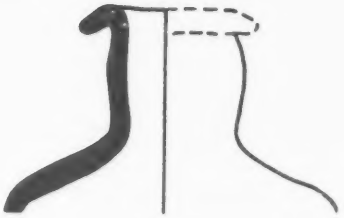
Figure 57. Lips.



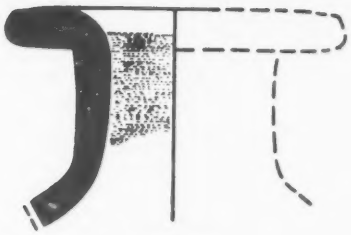
everted or flared



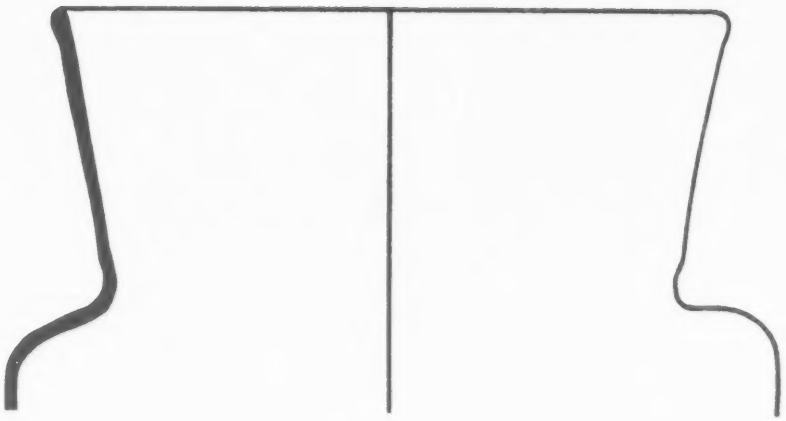
burst off



flanged

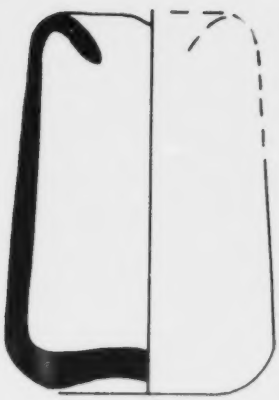


flanged

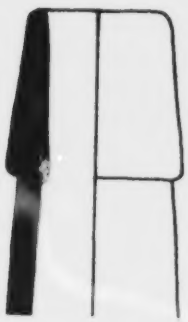


fire polished

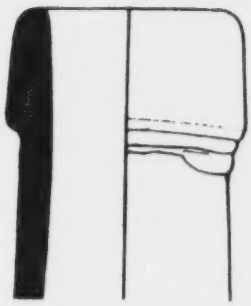
Figure 58. Lips.



inverted

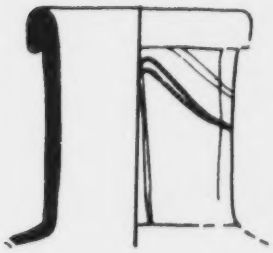


down-tooled

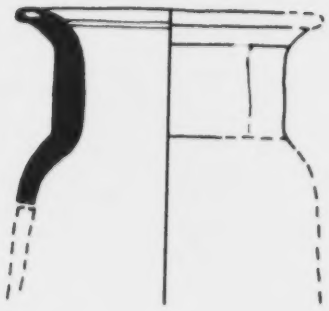


flattened side

tapered down

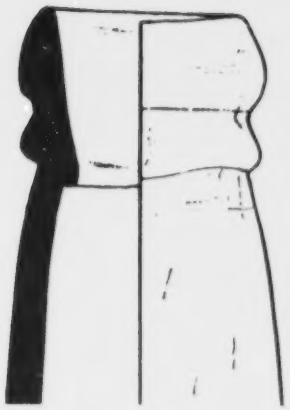


flat side, folded out

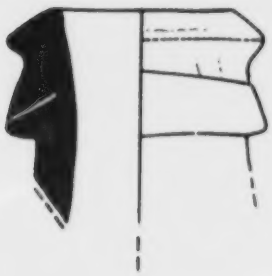


flanged, folded in

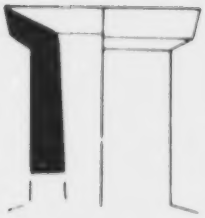
Figure 59. Lips.



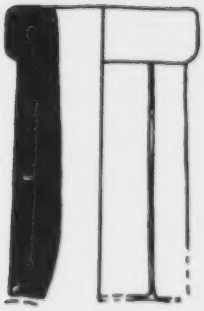
rounded side



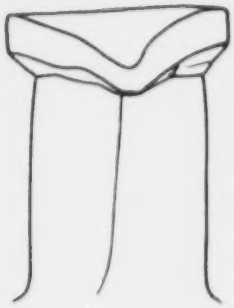
V-shaped

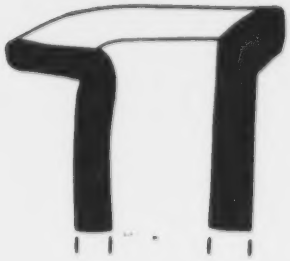


prescription lip



patent lip





pouring lip

Figure 60. Lips.

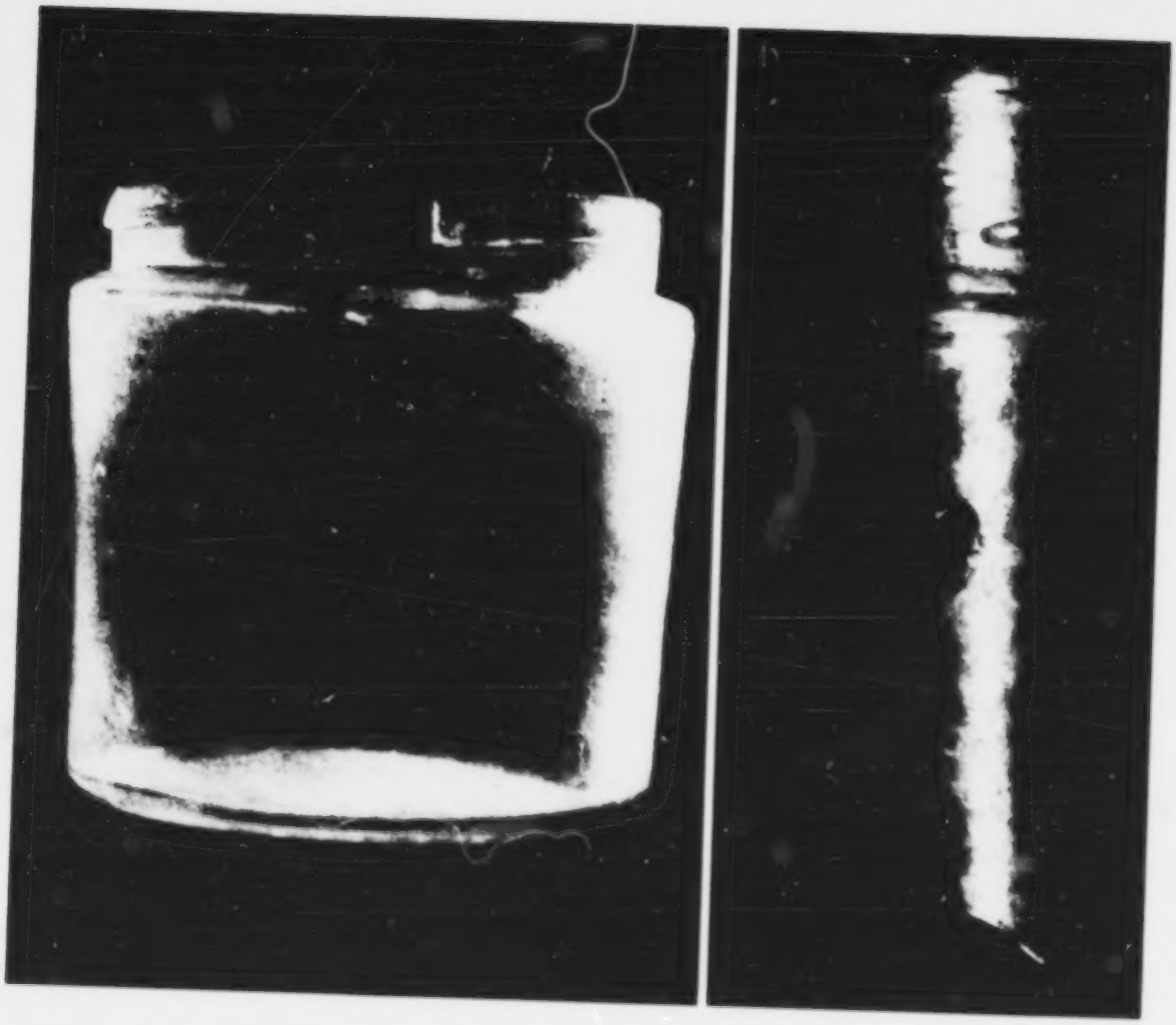
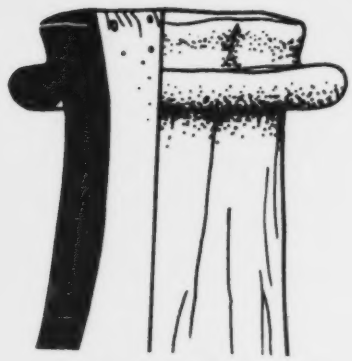
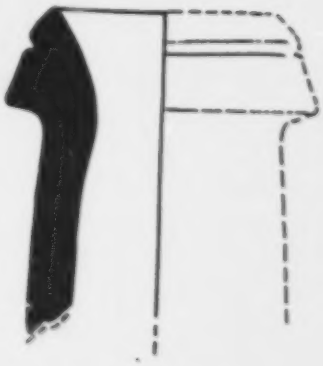


Figure 61. Threaded lips. (a) Lugs. (b) Continuous thread (C.T.).

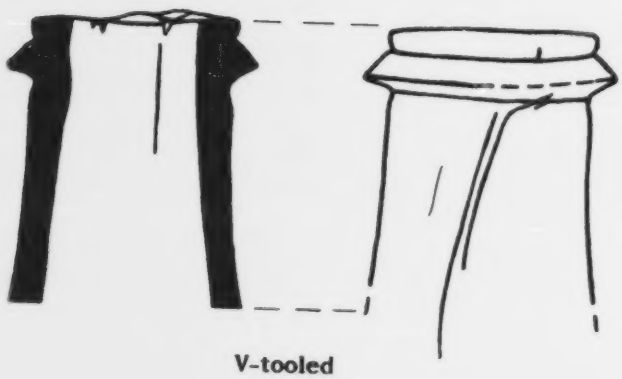
rounded trail



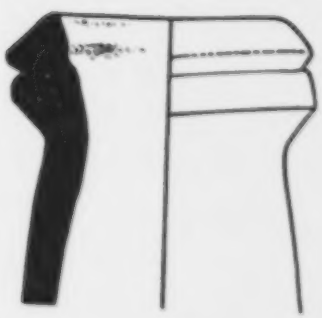
rounded, flattened top and bottom



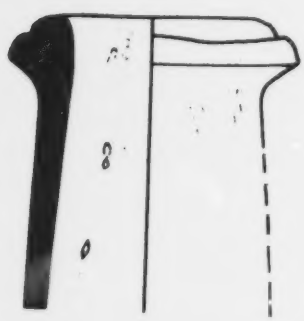
down-tooled



V-tooled



up-tooled, flattened side



up-tooled, V-shaped

Figure 62. String rims.

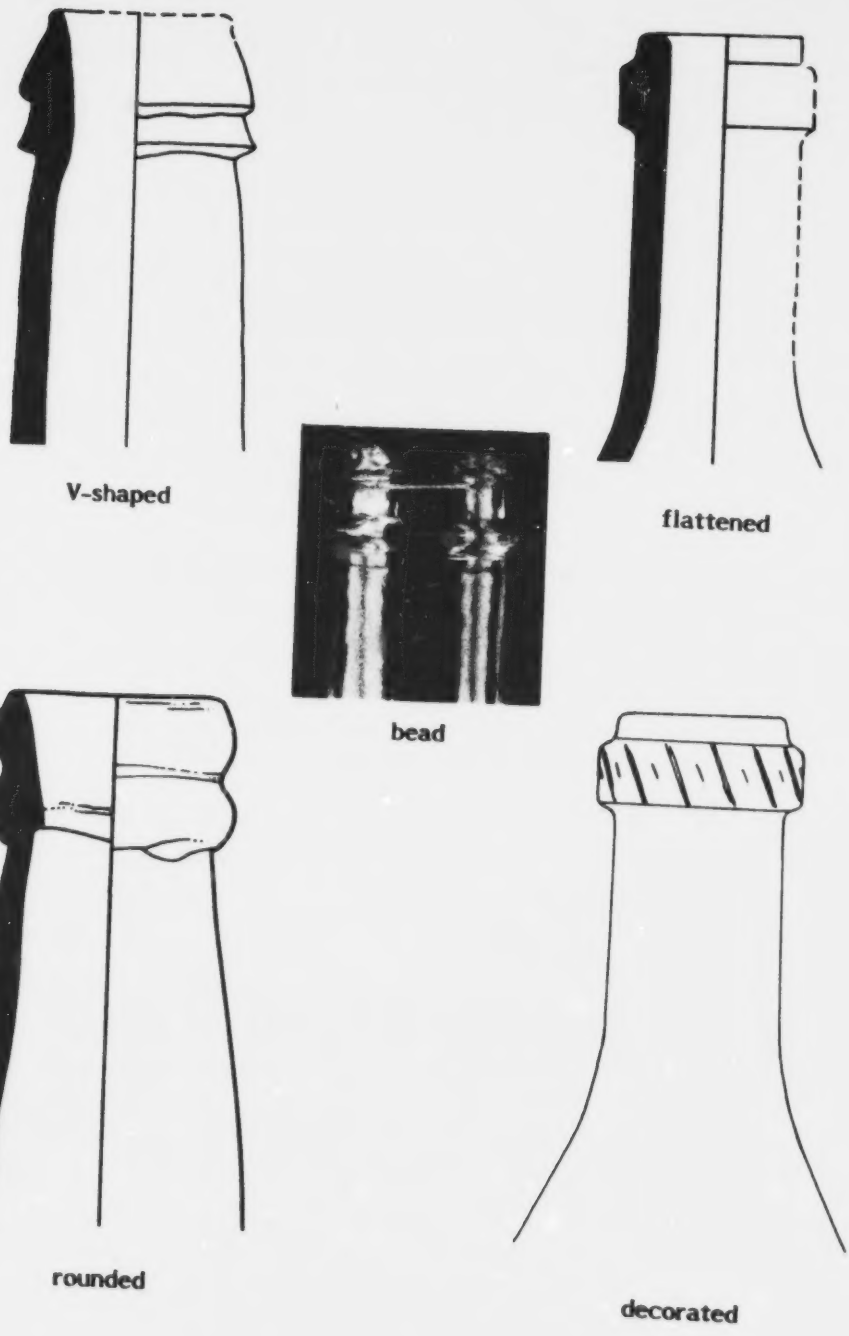


Figure 63. String rims.

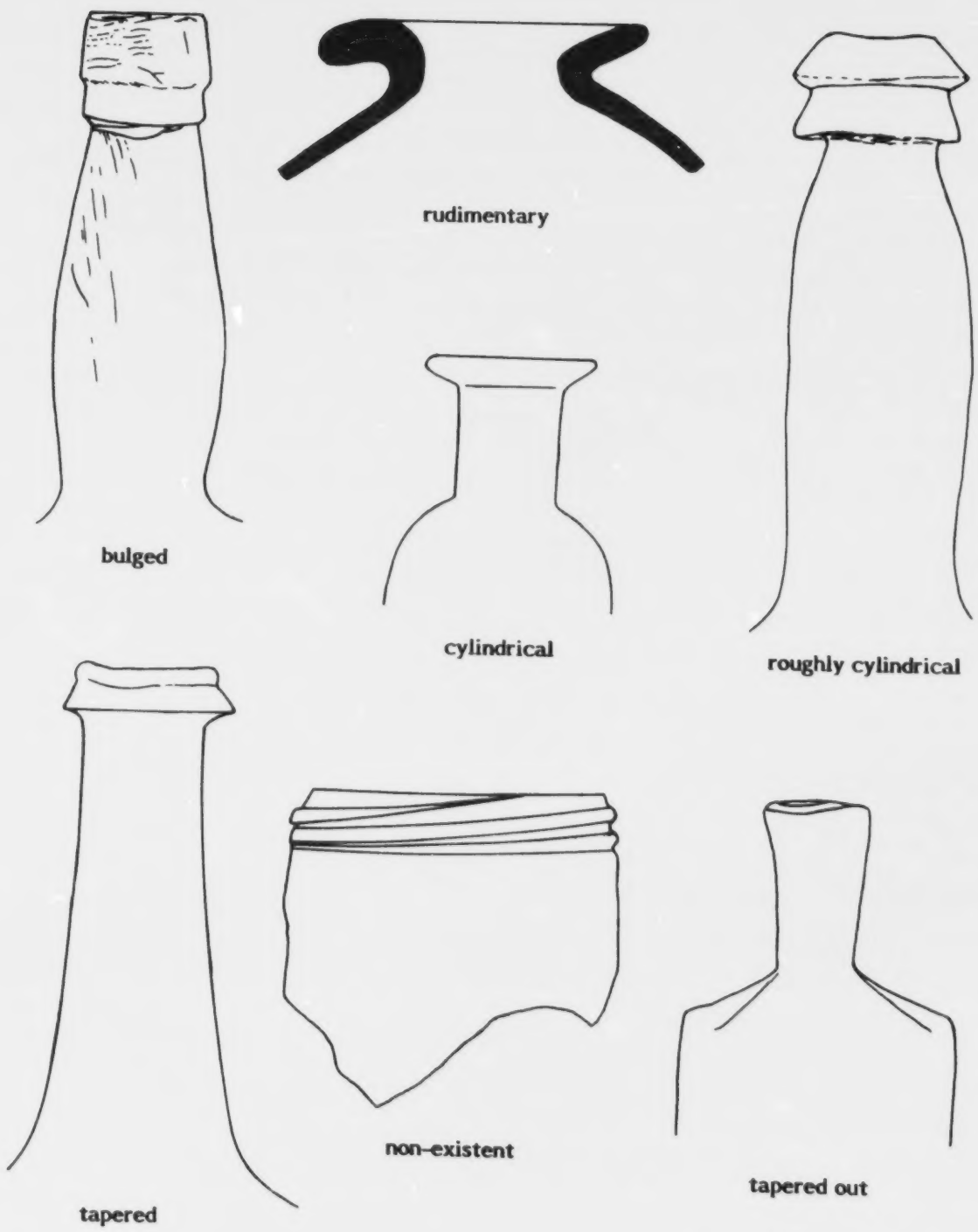
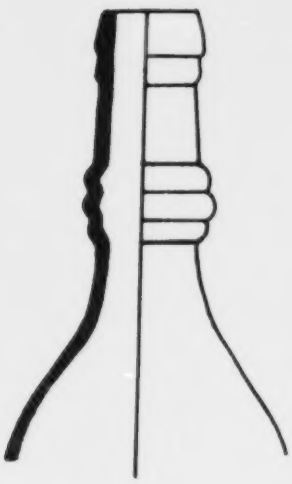
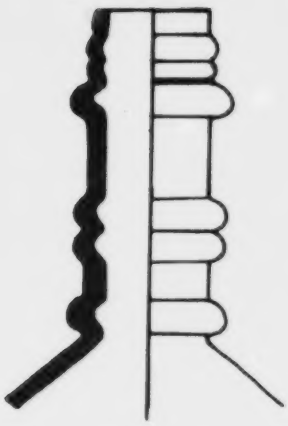


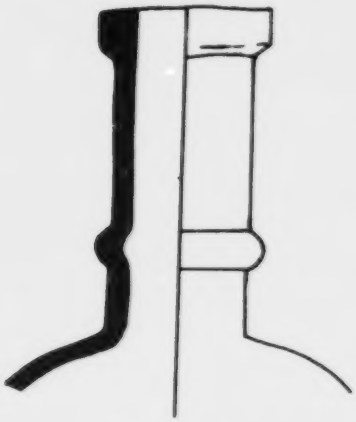
Figure 64. Neck shapes.



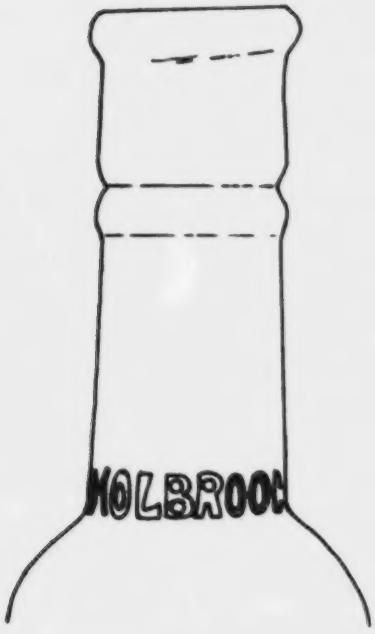
neck rings



neck rings



ball neck



marked

ground

Figure 65. Neck treatments.

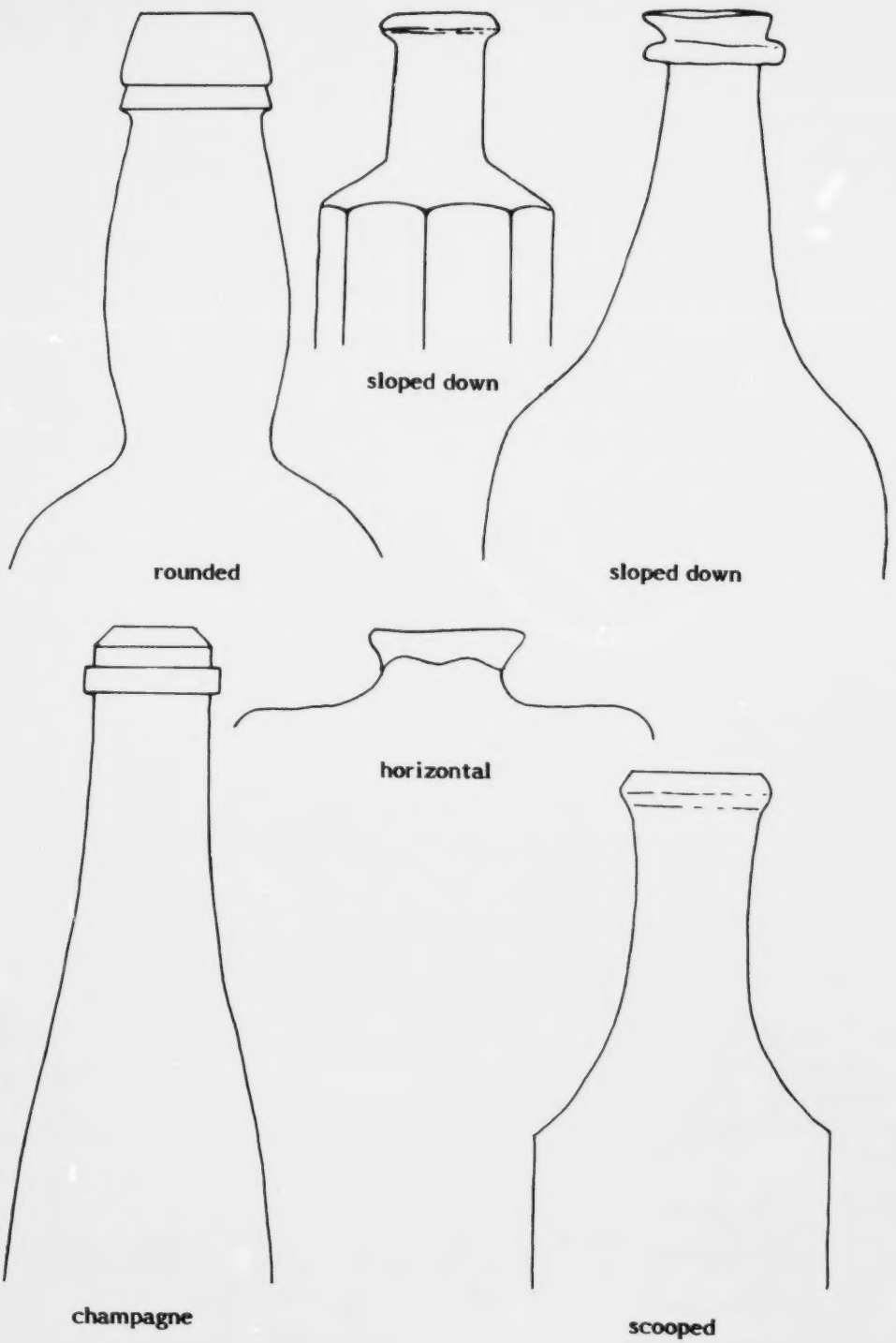
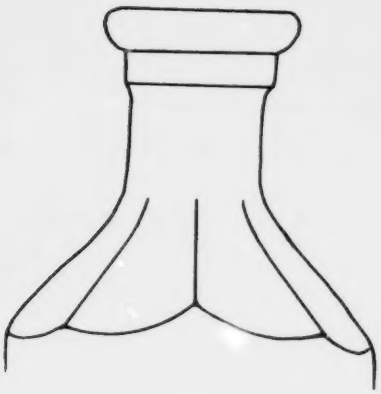
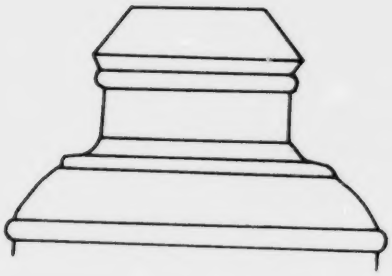


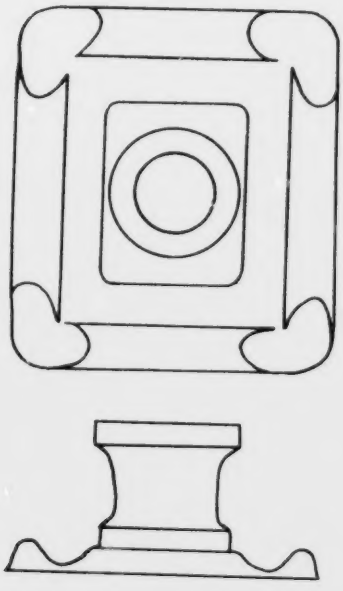
Figure 66. Shoulder forms.



fluted



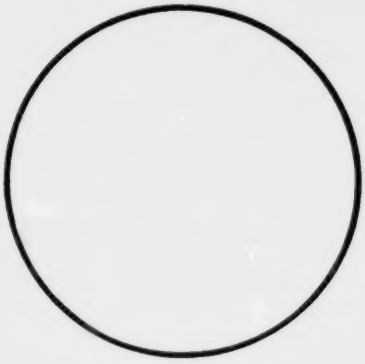
stepped



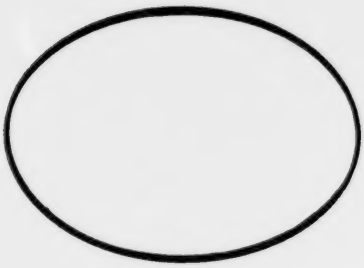
grooved

marked

Figure 67. Shoulder treatments.

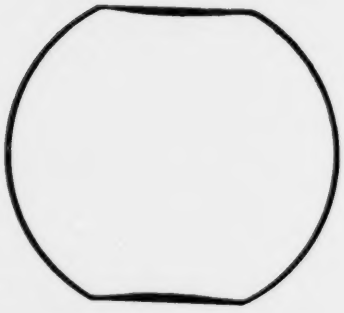


circular

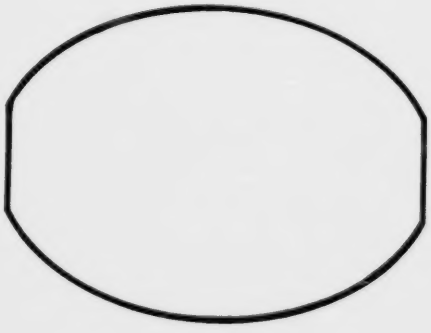


ovoid

kidney



round with flat sides



ovoid with two flat sides

Philadelphia oval

Figure 68. Body horizontal.

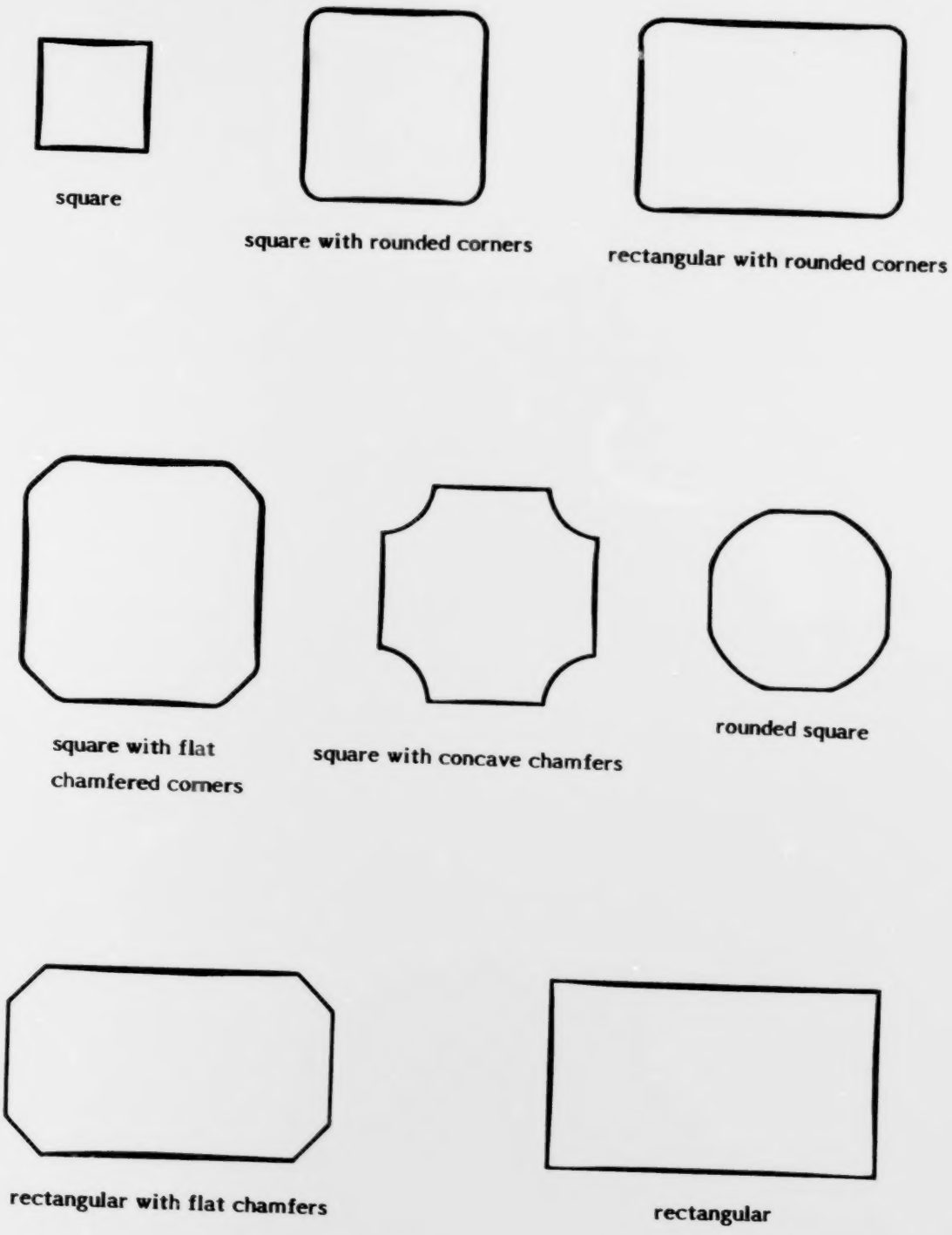
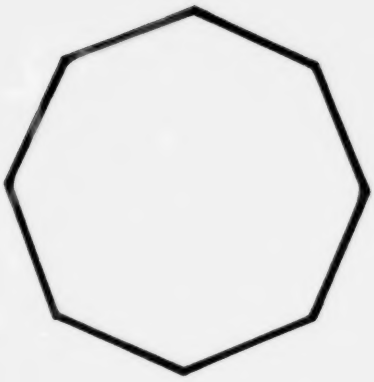
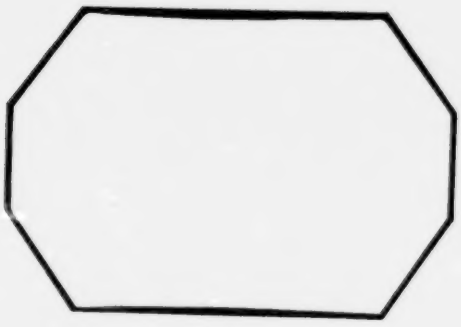


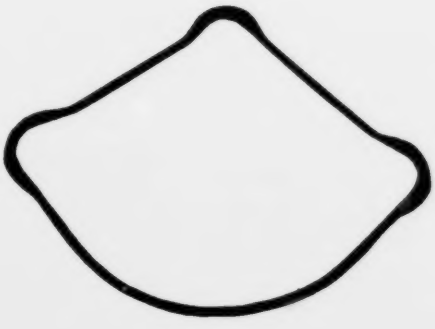
Figure 69. Body horizontal.



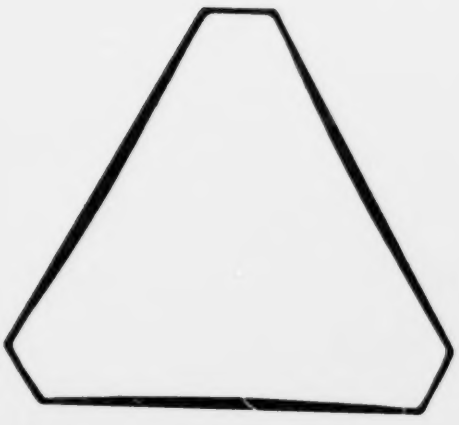
true octagonal



flat octagonal

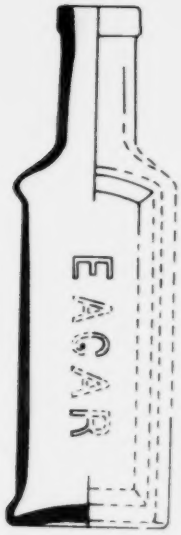


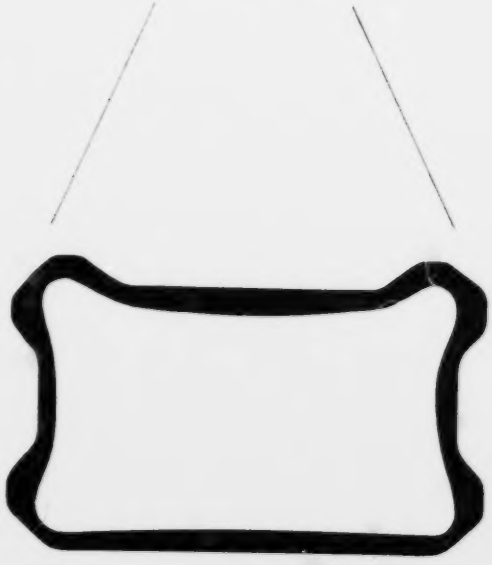
triangular with two recessed panels



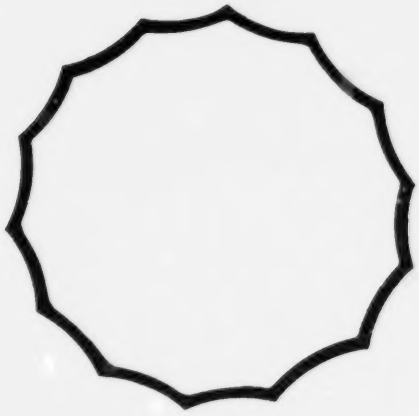
triangular with flat chamfers

Figure 70. Body horizontal.

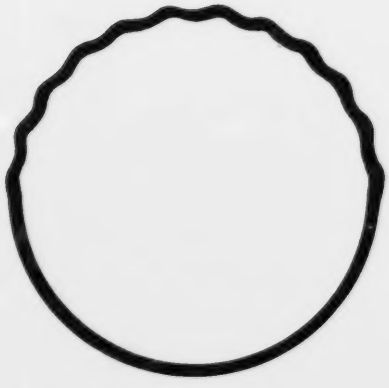




rectangular, 3 recessed panels, chamfered corners



round, decorated by 14 flutes



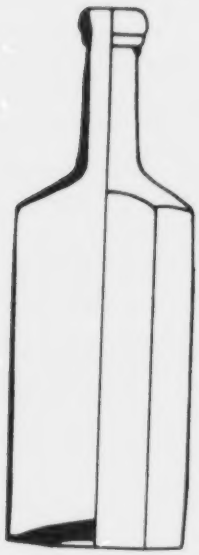
round, decorated on one half by 12 ribs

Figure 71. Body horizontal.

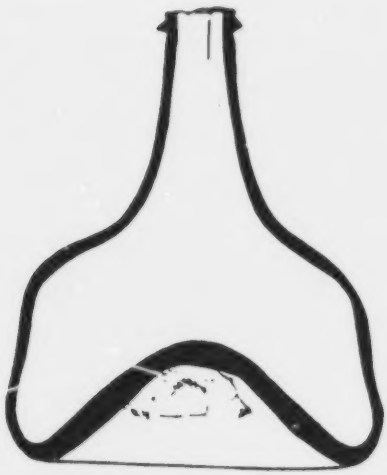
flask

flask, strapped
(Warrented flask)

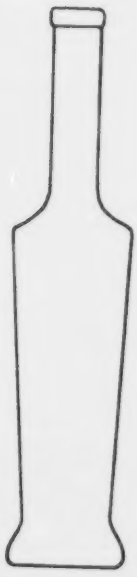
Figure 72. Body horizontal.



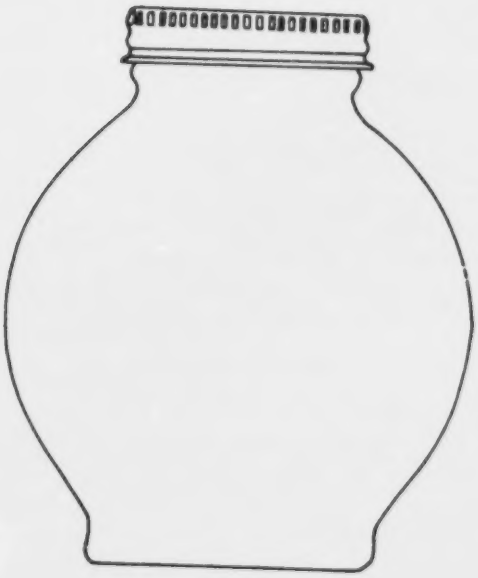
straight



tapered up



tapered



round

Figure 73. Body vertical.

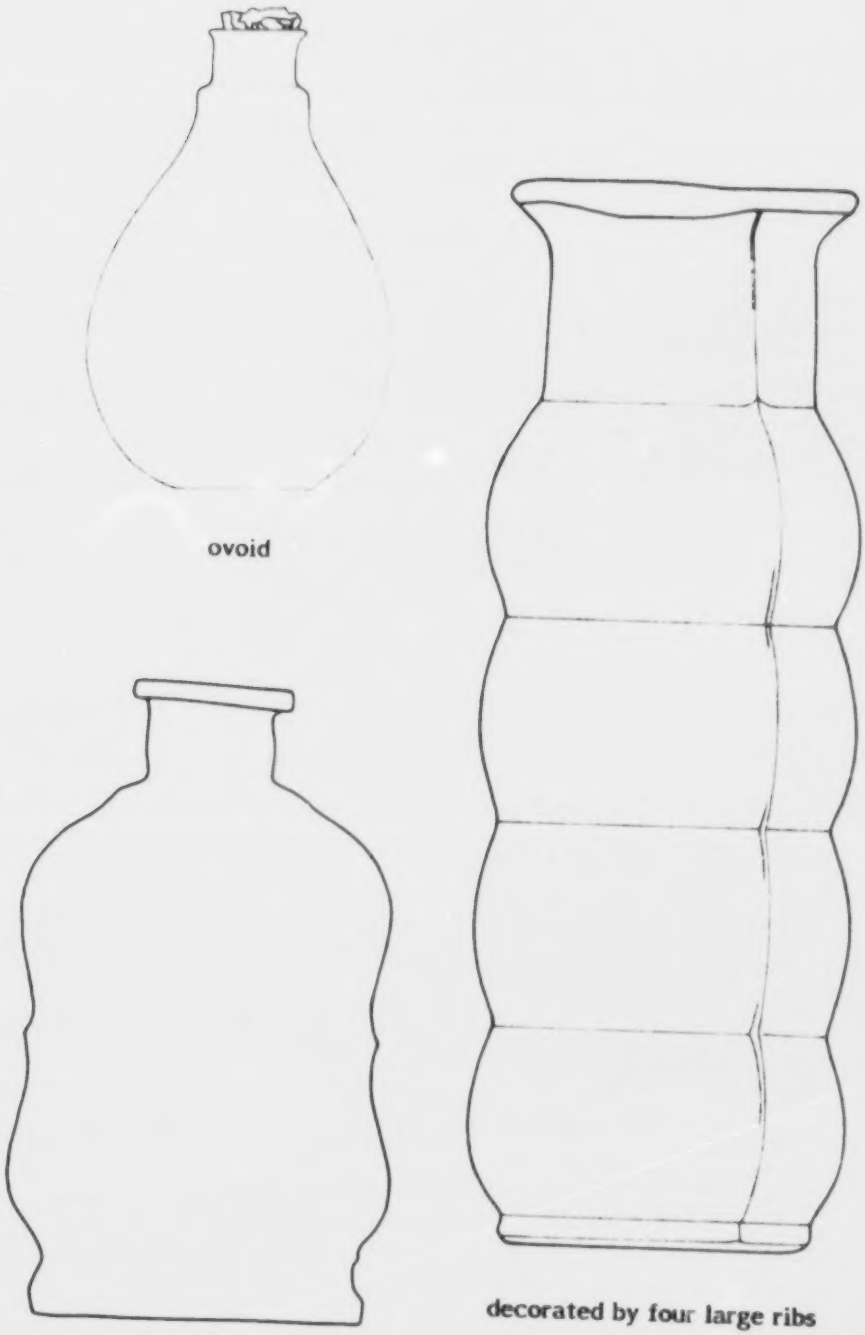


Figure 74. Body vertical.

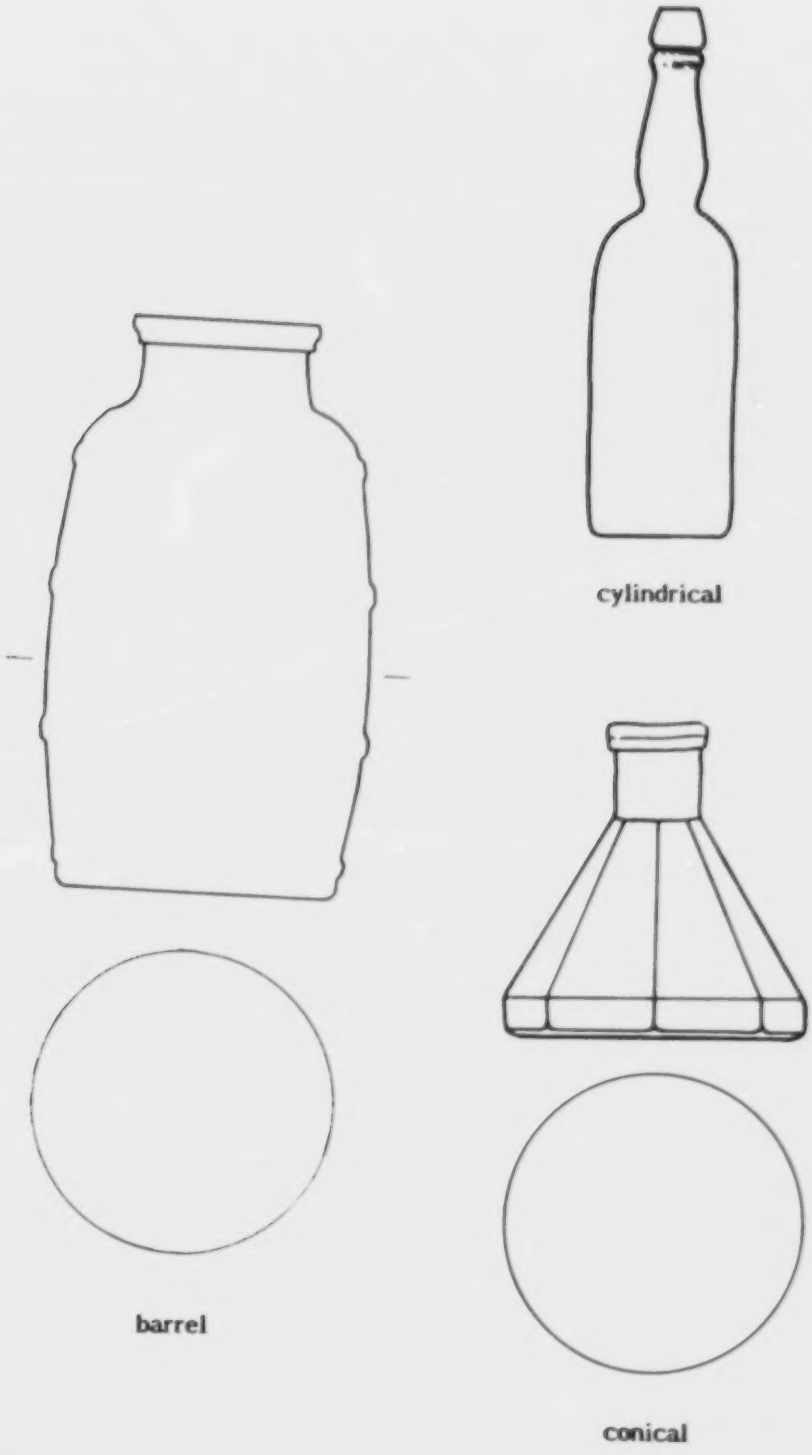
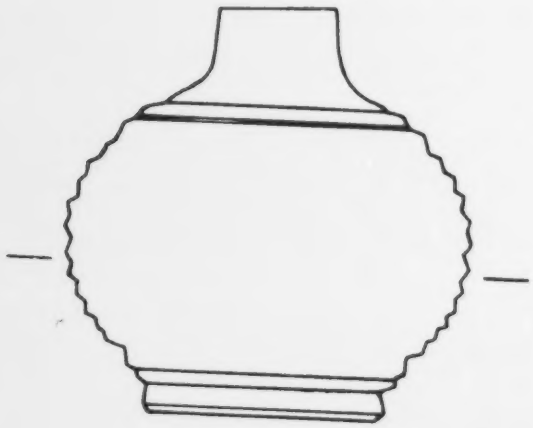


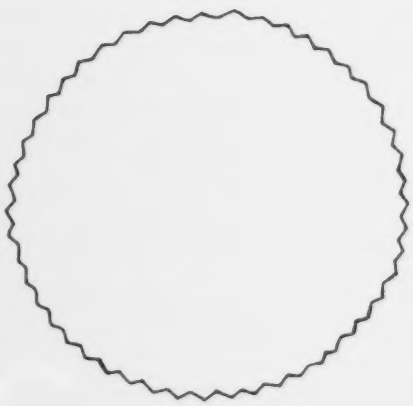
Figure 75. Body general.

egg-shaped

globular

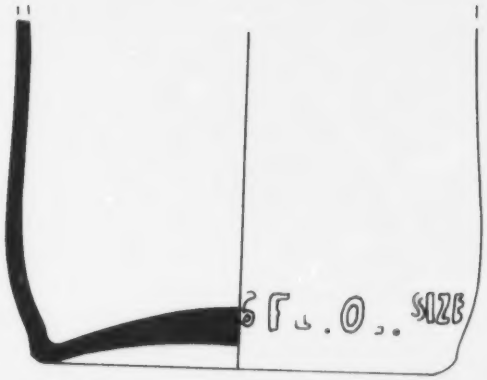


figural



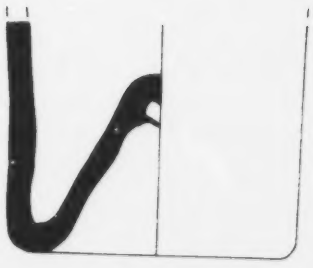
spherical, decorated

Figure 76. Body general.

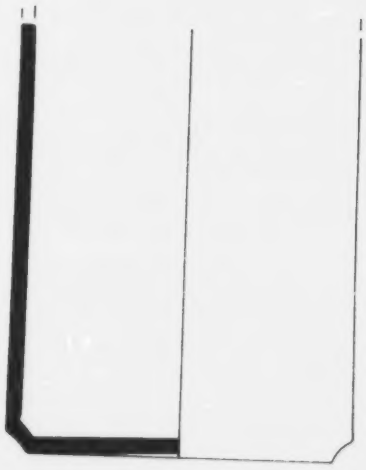


inswept, marked

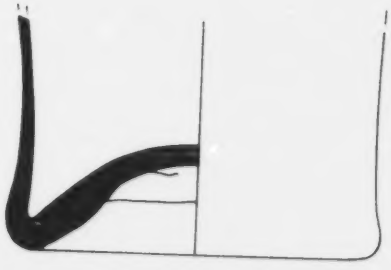
abrupt



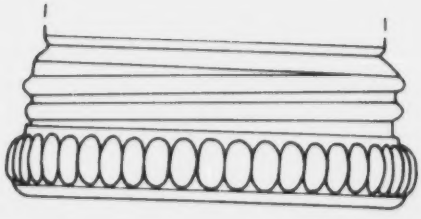
rounded



chamfered



bulged



decorated

Figure 77. Heel.

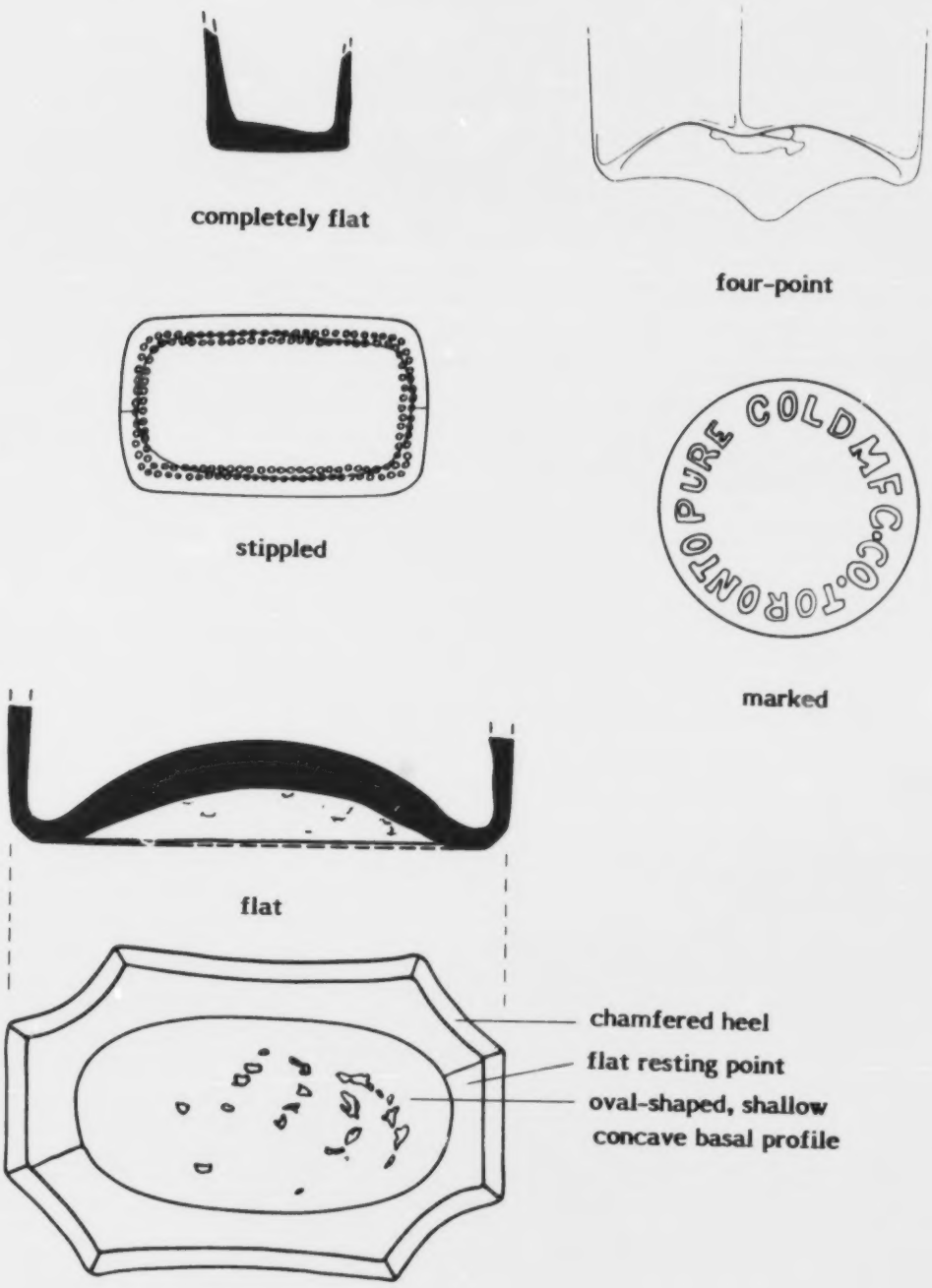
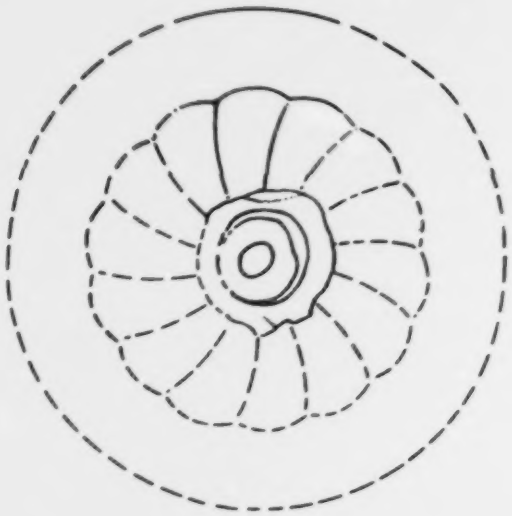


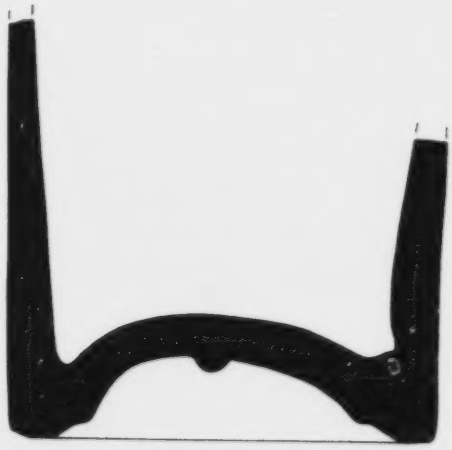
Figure 78. Resting point.

marked

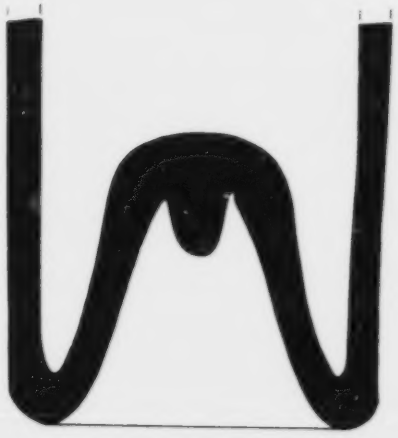


decorated

footed

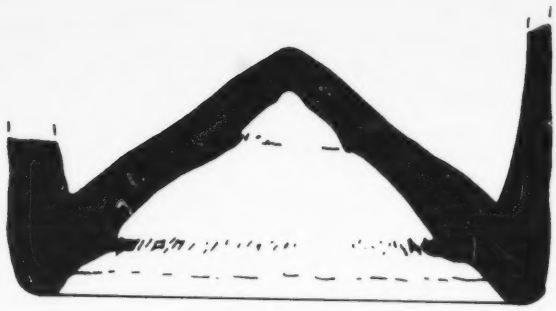


mamelon



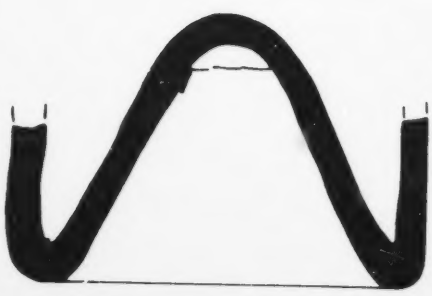
large mamelon

Figure 79. Base general.



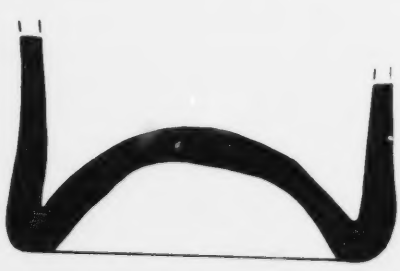
conical

conical



rounded cone

rounded cone



dome

dome

Figure 80. Basal profiles.

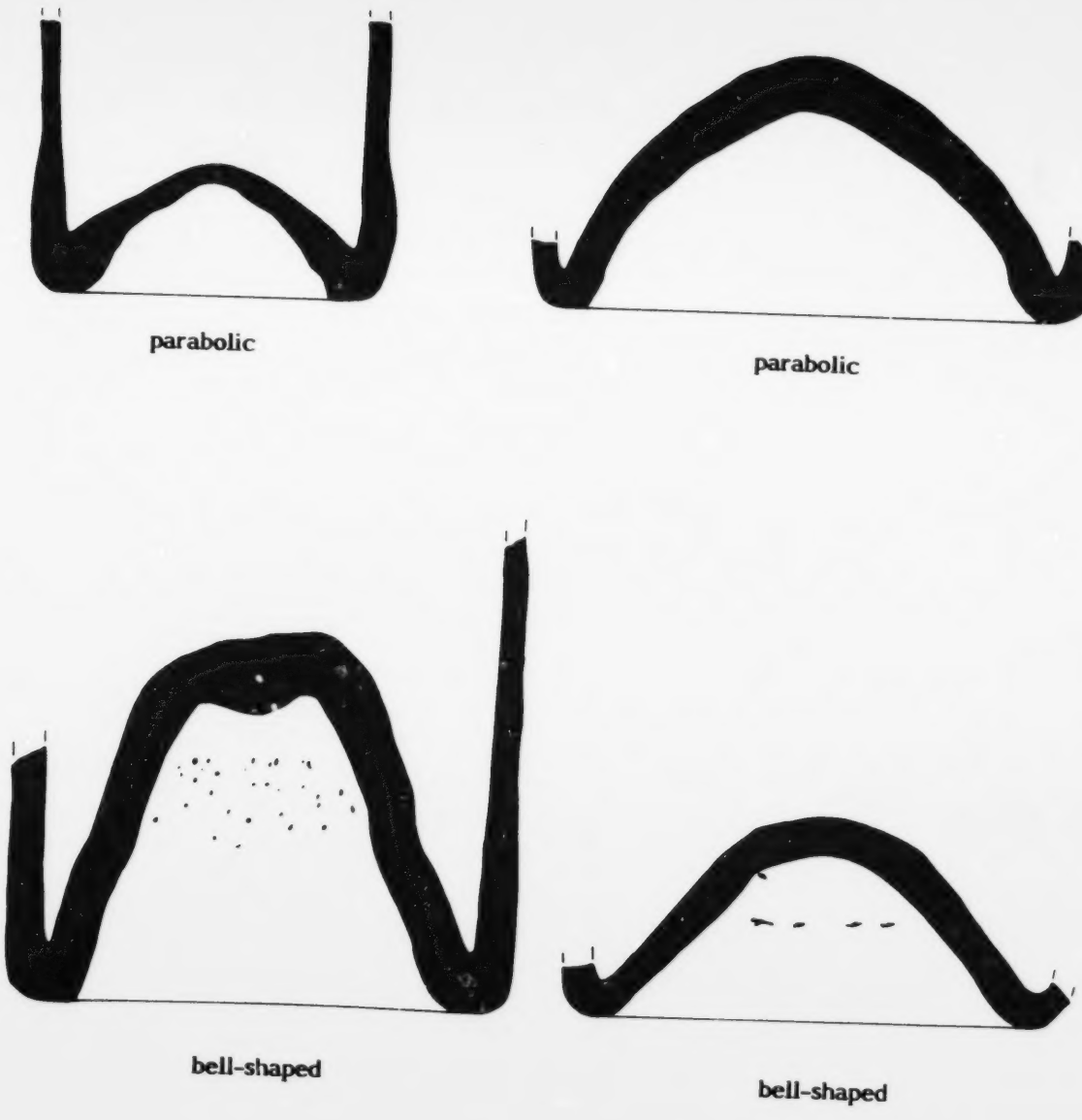


Figure 81. Basal profiles.

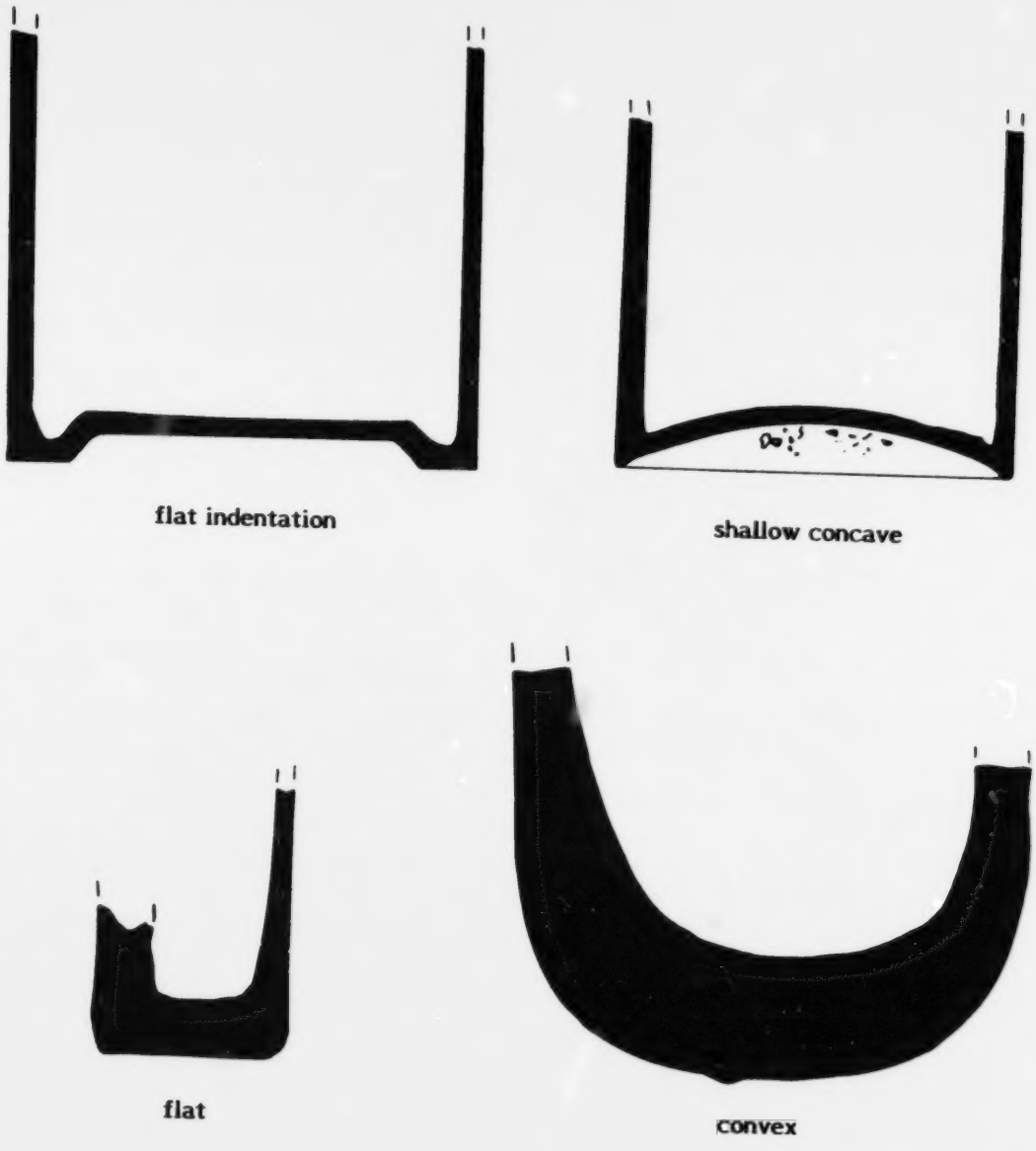


Figure 82. Basal profiles.

CONTAINER DIMENSIONS

It is recommended that measurements not be taken without an immediate and specific goal in mind, such as the development of a bottle type, publication of a catalogue, management of a collection, or determining a minimal vessel count. Archaeological collections should be mended before measuring. The measurements given below have been found to contribute to a determination of container type, function, volume, date, and/or country of manufacture. The usefulness of each of the measurements varies, depending on the container type, the time period involved, and the country of origin of the material. Use of preprinted forms or rubber stamps is recommended for time saving and for accuracy in recording large bodies of data.

All measurements are taken in metric units. When taking measurements the calipers or rulers should be held parallel to the vertical or horizontal plane of the object being measured. Check the ruler being used; some of them have a short space before the measurements start and this should be compensated for. It is advisable not to use this type of ruler at all if rulers that begin the measurements at the end are available.

Irregularities in size of parts of containers are not uncommon. A range of measurements may be given (e.g. 7-10 mm), or a midpoint measurement may be given, or even a measurement that appears to represent the intended size.

Bore diameter — The size of the bore in conjunction with the general appearance of the finish and the size of the container gives an indication of the possible function of the container. Bore diameter is always taken at the beginning of the bore to make bore diameters comparable. The terms "narrow mouth" and "wide mouth" may be found to be more useful than the actual measurement as they represent the size of the bore in relation to the rest of the container, e.g. a bore diameter of 20 mm on a large, long-necked bottle, such as a "wine" bottle, would be considered narrow-mouthed whereas the same measurement on a small, short-necked bottle, such as food storage container, would be considered wide-mouthed.

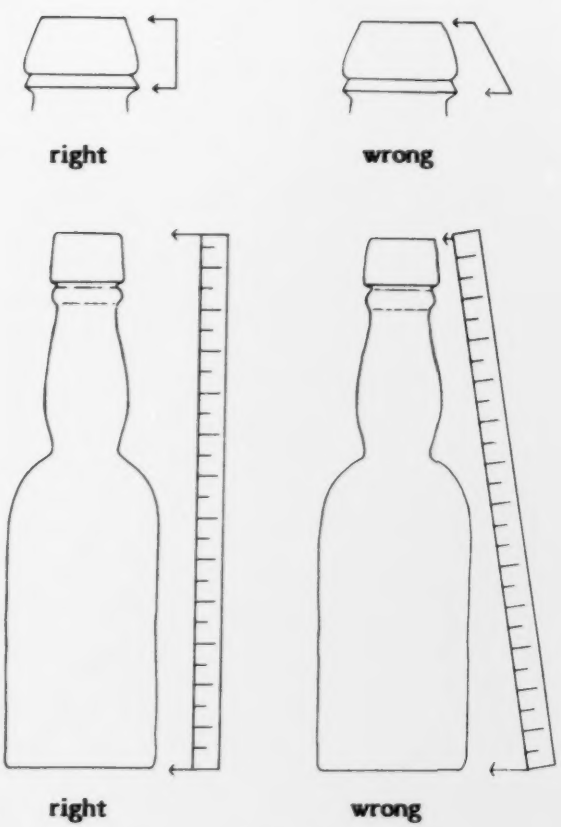


Figure 83. Taking measurements.

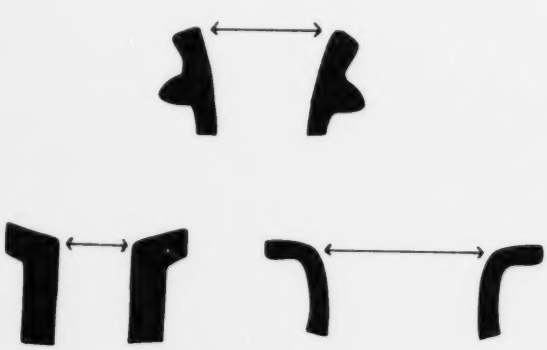


Figure 84. Bore diameter.

Lip height— The lip height is used to separate lips of the same shape but of different sizes. It is also used in determining what proportion the lip is to the whole finish. For English "wine" bottles of the ca. 1770-1820 period the lip height can be used as a dating device. The lip height is taken from the top of the lip to the bottom of the lip.

String rim height— The string rim height is used to separate string rims of the same shape but different sizes and to determine what proportion of the finish is represented by the string rim. It is not recommended for general use. The measurement is taken from the top of the string rim to the bottom of the string rim.

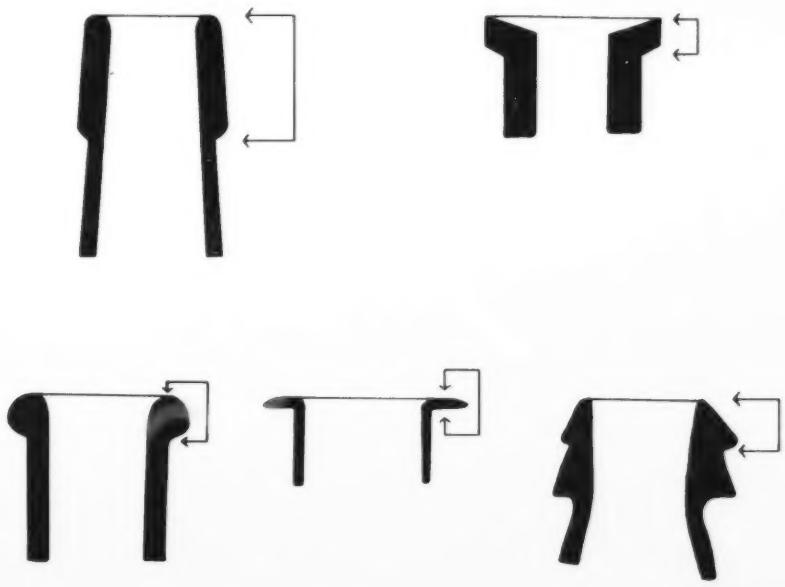


Figure 85. Lip height.

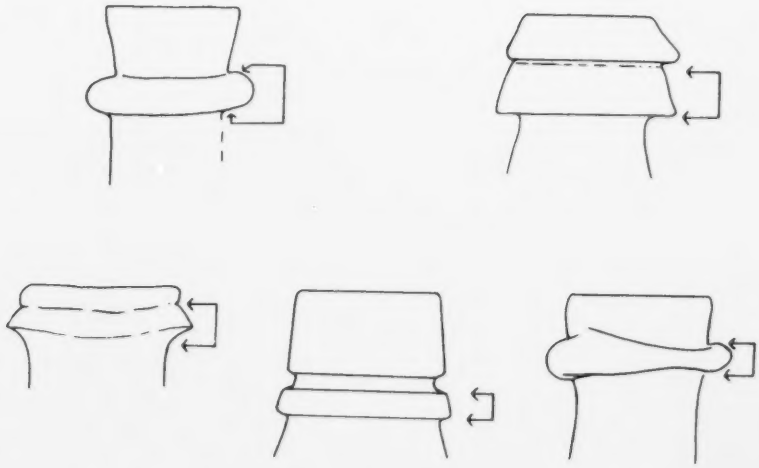


Figure 86. String rim height.

Lip to string rim height — This is a specialized measurement that applies to containers having a string rim with only the top of the lip present. It is particularly useful in the first half of the 18th century to distinguish French dark green glass liquor bottles from English dark green glass "wine" bottles. In the 19th century it applies most frequently to "French wine," champagne, or olive oil bottles which should only be measured for typological studies. The measurement is taken from the top of the lip to the top of the string rim. If the top of the lip is not horizontal but slopes downward slightly, the measurement is taken from the outer edge of the lip to the top of the string rim.

Finish height — The finish height includes the lip height, string rim height, and any other element considered to be part of the finish. The finish height is taken in addition to the lip and string rim height because there may be space between these two parts of the finish. The size of the finish contributes to the determination of container "type" and operates within a very narrow margin of variation. When the finish consists of only a lip, the lip height is given and not the finish height. The finish height is only measured with a two-or three-part finish.

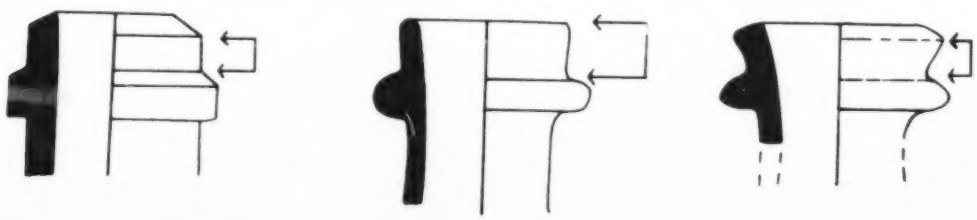


Figure 87. Lip to string rim height.

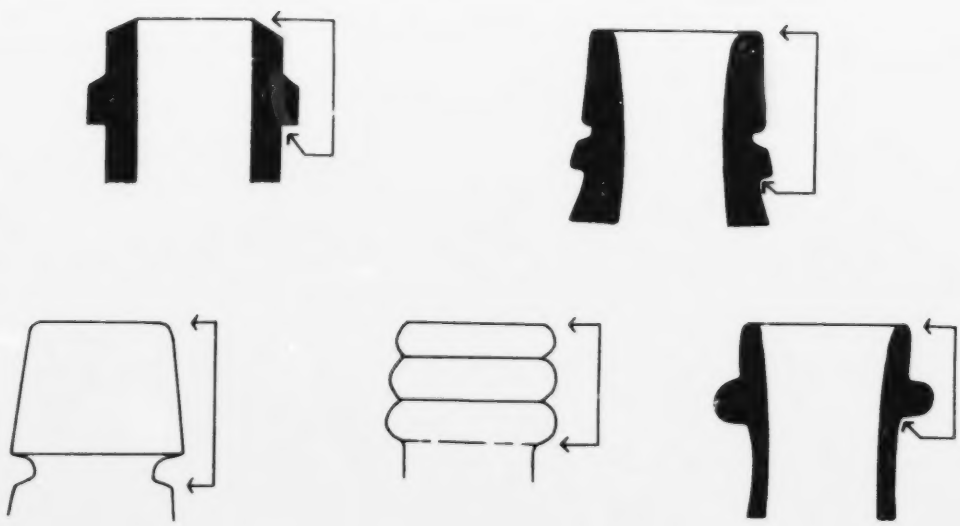


Figure 88. Finish height.

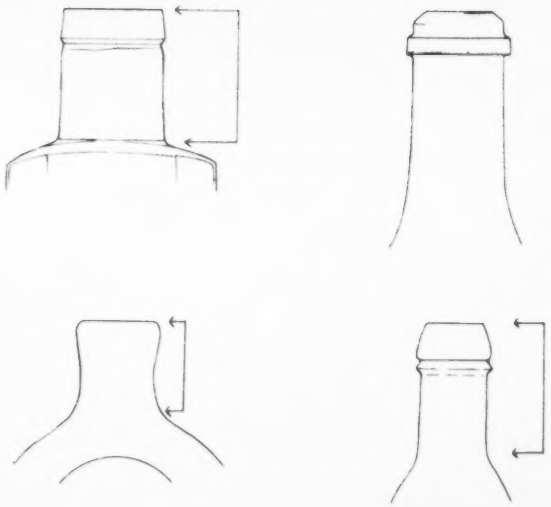


Figure 89. Neck-finish height.

Neck-finish height — This measurement is taken from the top of the finish to the base of the neck. The measurement can be used for establishing container "type." In complete examples, by subtracting the neck-finish height from the container height the body-shoulder height can be calculated. When the neck-shoulder junction is not clearly defined, as in champagne bottles, the measurement should not be taken.

Body dimension 1 — In combination with the base diameter this measurement contributes to the determination of container "type." When the lower body and base are missing, body dimension can be used to give an idea of the general size of the body. Body dimension is taken just below the body-shoulder junction. The dimension is *not* used for globular or egg-shaped bottles (see Maximum Body Dimension), nor should it be taken when it is the same as the base dimension. The term "dimension" is used rather than "diameter" because the horizontal body shape can vary considerably. If a diameter is given it is expressed as 36 mm. If a rectangular or ovoid dimension is given it is expressed as 36 x 84 mm. If a square dimension is given it is expressed as 36 x 36 mm.

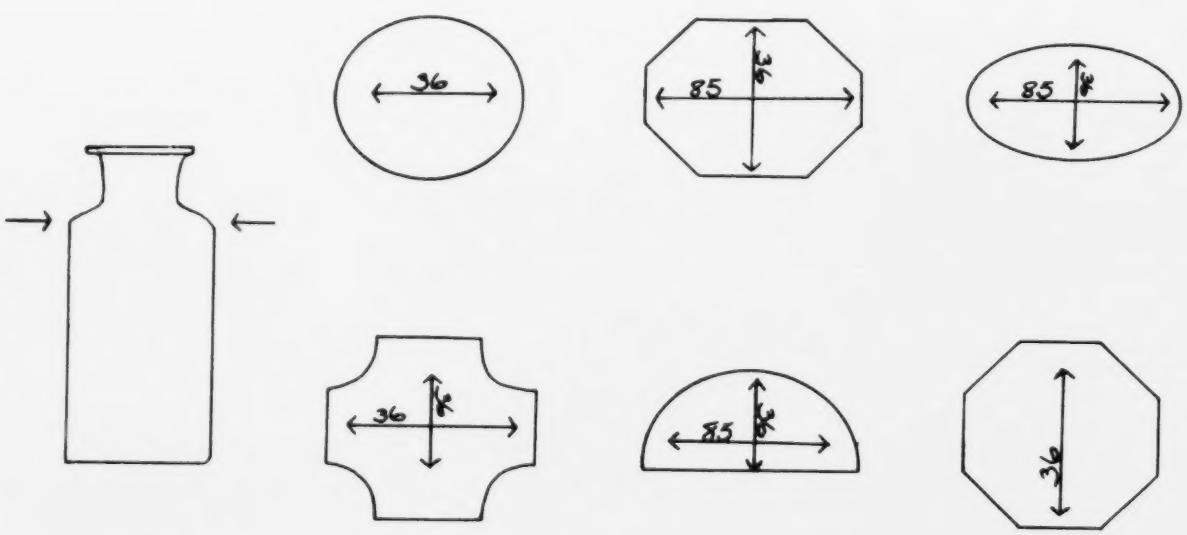


Figure 90. Body dimension 1.

Figure 91. Body height.

Body height — The height of the body is associated with volume, and can be used to establish container function, type, and date. The body height extends from the resting point of the container to the body-shoulder junction. The simplest, most accurate way of taking this measurement is to stand the container upright on a table, stand a ruler on the table perpendicular to the table, and measure the distance from the table to the body-shoulder junction of the container. In cases where the shoulder-body junction varies deliberately, as on panelled bottles, the maximum height is taken. The term "Max." can be put in after the measurement but is not necessary if this convention is followed regularly. In examples where the body-shoulder junction varies accidentally, as in 18th century cylindrical "wine" bottles, the height is the one that seems closest to that intended. If the height varies more than a few millimetres, give a range or calculate a midpoint. For containers that do not have a shoulder, the body height is taken to the base of the neck.

Base dimensions — Base dimension is closely related to capacity and is particularly useful for studying fragmentary containers. In combination with Body Dimension 1 this measurement can be used for determination of container "type," particularly for those containers with a strong taper. Base dimensions are taken on the outer edge of the base, at the top of a heel chamfer, or on the outer edge of a basal sag. The term "dimension" is used rather than "diameter" because the base shape can vary considerably. If a diameter is taken it is expressed as 36 mm. If a rectangular or ovoid dimension is given it is expressed as 36 x 85 mm. If a square dimension is given it is expressed as 36 x 36 mm. On globular bottles the resting point dimensions should be used. For French 18th century liquor bottles with the tapered out bodies the base diameter is taken at the body-heel junction. In cases where the base dimensions vary accidentally, as in 18th and early-19th century "wine" bottles, the diameter is the one that seems closest to the intended diameter. If the diameter varies more than a few millimetres give a range, e.g. 95-102 mm, or calculate a midpoint, e.g. 98.5 mm.

Container height — The total height of the container from the table surface to the top of the finish. The container height helps establish volume, "type," function, and may be useful in determining date.

Weight — The weight of a complete container in grams. *Do not weigh an incomplete example.* The weight of a container was of major concern to glassmaking companies, as it is related to the amount of glass used to make a container blown in a mould of known size and intended capacity. To convert, 1 oz. equals 28.3495 g.

Volume — Capacity terms, such as 1/2 ounce, pint, quart, pound, and half-pound, were frequently used by glassmakers and wholesalers to describe their containers. Volume measurements can be used to establish functions and a range of sizes for a given

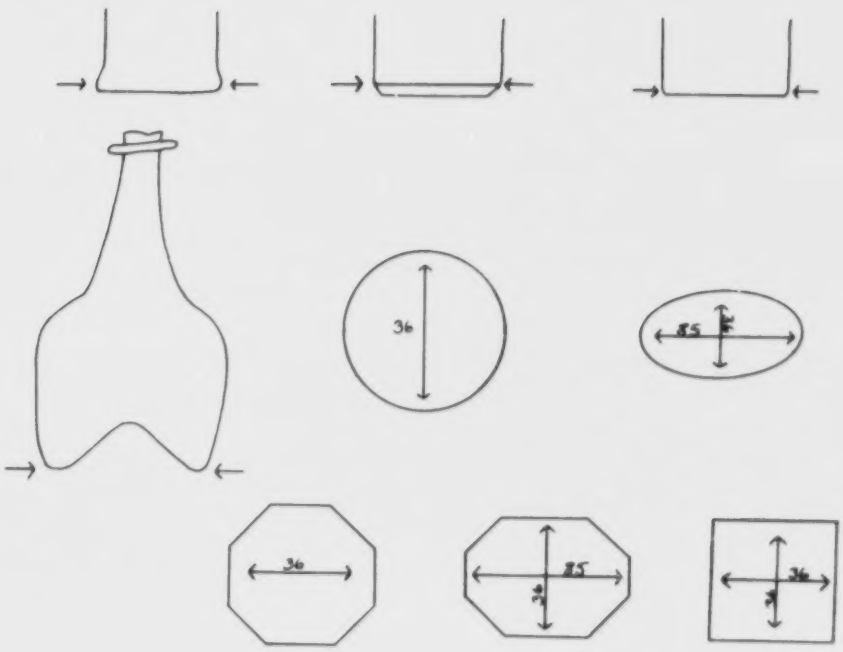


Figure 92. Base dimensions.

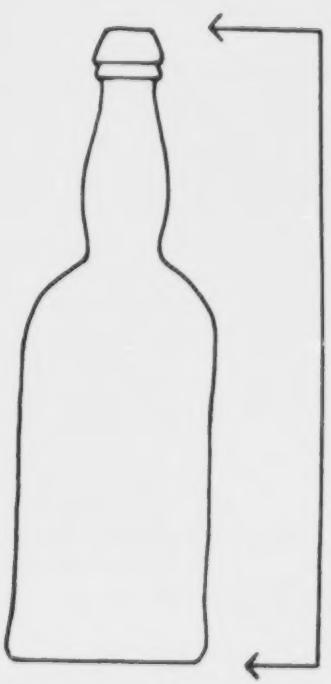


Figure 93. Container height.

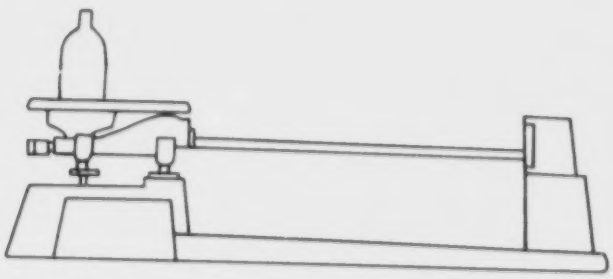


Figure 94. Container weight.

bottle type and to link a container group to the historic documentation. Two volume measurements are possible: (a) Filling height. The height to which a container is intended to be filled (Moody 1963: 299, 33-35). For this measure space should be left for the closure, such as a cork, and for a "head space" below the closure. This volume relies on the judgement of the researcher/cataloguer and does not necessarily reflect historical reality. However the filling height is closer to the "functional" capacity of a container than is the

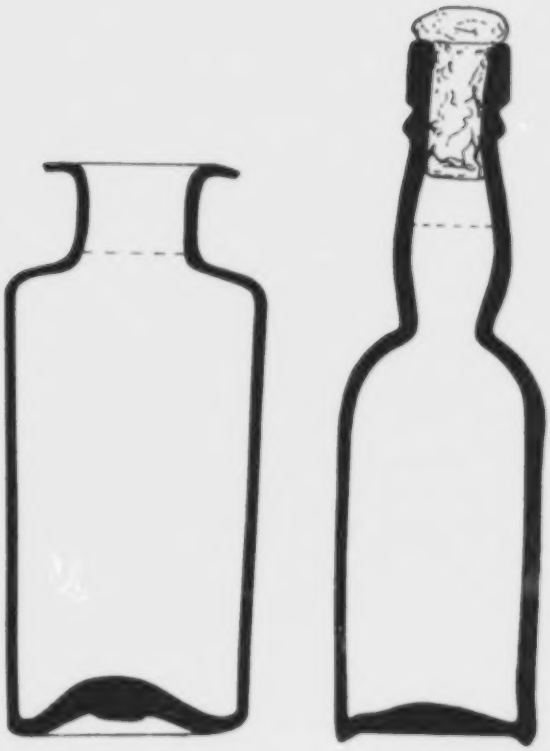


Figure 95. Volume.

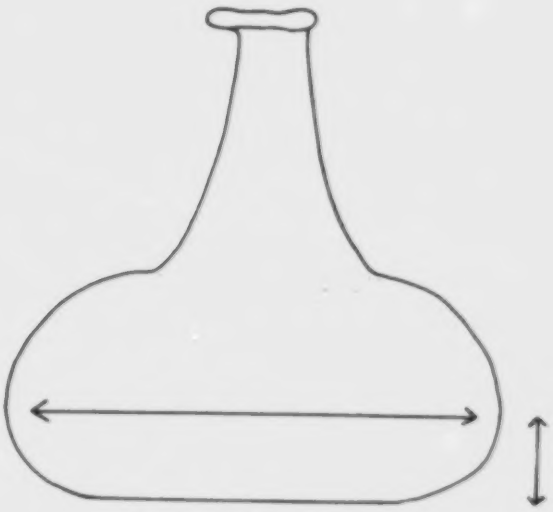


Figure 96. Maximum body dimension and height of maximum body dimension.

brimful capacity. (b) Brimful capacity. The volume of liquid a container holds when it is filled to the brim (Moody 1963: 298). This represents the maximum capacity of the container and is not subject to cataloguer/researcher bias. The functional capacity is always less than the brimful capacity. State which capacity was taken. All volumes should be taken with water and measured in millilitres. Dry angular substances such as seeds or sand do not give consistent volume readings. Solid 3-mm glass beads can be used to measure capacity instead of water, although they are considerably heavier and may cause problems with delicate material. Millilitres are used because ounce sizes vary, e.g. the British fluid ounce equals 28.4123 mL and the American fluid ounce equals 29.5729 mL. It should be noted that this is the liquid capacity of a container. Powdered substances may have been sold by weight and if it is desirable to know the actual quantity of material being sold in a specific container, the artifact researcher will have to make additional calculations to arrive at the weight/volume equivalents.

Maximum body dimension and height of maximum body dimension — Used together, these measurements are useful for determining size and date of English "wine" bottles of the ca. 1650-1750 period. They may also be used for other oddly shaped bodies that have deliberate expanding and contracting contours, such as egg-shaped mineral water bottles.

Resting point dimension — Resting point dimension is used for bottles with no definite base-heel junction to give an idea of the size of the bottle. This measurement is most useful for circular, bladder-shaped, or ovoid bottles of the early 18th century. These bottles are so individual that the resting point dimension is one of the few

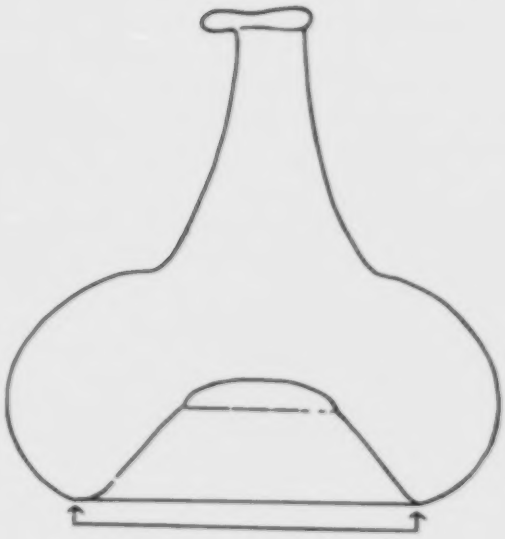


Figure 97. Resting point dimension.

consistent measurements that can be taken from them. If a diameter is given it is expressed as 36 mm; if an ovoid dimension is given it is expressed as 36 x 85 mm.

Pushup height — The pushup height can contribute to the determination of a container style and country of manufacture but it should be taken only when being used for a specific study. The height is taken from an imaginary plane across the resting point to the highest part of the pushup.

Pontil mark diameter — The outer diameter of the pontil mark. These diameters are related to the empontilling technique used and, in certain cases, to the country of manufacture (Jones 1971) but the measurement should be taken only when being used for a specific study.

Figure 98. Pushup height.

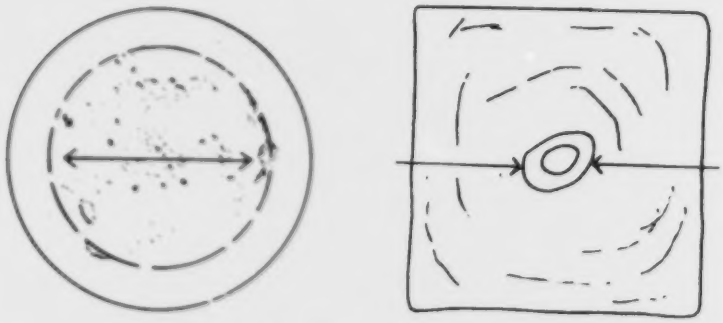


Figure 99. Pontil mark diameter.

PART III. GLASS TABLEWARE

CATEGORY

Tableware — A general term applied to glassware used on the table and associated with food and drink, as well as some items of decorative glassware, such as vases.

MANUFACTURE: TABLEWARE

The body forming techniques in the list of tableware manufacture terms are explained at length in Manufacturing Techniques in Part I. However the terms used to describe parts, miscellaneous treatments, and so on are explained here as they apply to tableware.

One-, two-, three-, four-part manufacture — Stemware can be made of several different pieces of glass attached to each other. As the number of parts is often considered in distinguishing one type of stemware from another the number of parts is usually noted. (a) One-part. Stemware made of one piece of glass. This is a very ancient forming technique which continued into the 18th century. Examples appear in French contexts at the Fortress of Louisbourg (McNally 1979: 25). The glass is blown into a large bubble and the base of the bubble is pushed back into the cavity. The bowl, stem, and foot are then formed with the surface of the bubble base forming the base of the bowl. This results in a glass with single thickness in the bowl and double thickness in the stem and foot. Large air bubbles are usually trapped between the two layers. The type is easily recognizable. (b) Two-part. Also called a "drawn stem." The stemware object is made of two pieces of glass, the bowl and stem formed from one piece, the foot added. The stems of these items are generally plain. (c) Three-part. The bowl, stem, and foot are formed from separate pieces of glass. This technique tends to be used for more elaborate stems with knops, enamel twists, air twists, and so on. (d) Four-part. In addition to the foot and bowl, the stem is made in two parts. Generally used for elaborately knopped examples and is not often found on our sites (see Haynes 1959: 206).

Table 3. List of terms for tableware manufacture

Body	
	Moulded
	Mouth blown
	Free blown
	Machine-made
	Press moulded
	Contact moulded
	Pattern moulded
	Optic moulded
	Turn moulded
Parts	
	Applied handles, applied foot, 1-, 2-, 3-, 4-part manufacture
Miscellaneous	
	Folded foot, ground resting point, cut body, pinched
Base	
	Pontil mark unfinished
	Pontil mark finished
	Pontil mark roughly ground
	Not empontilled
Finish	
	Ground lip, ground bore, ground neck, folded lip, cut lip or rim, (and other unusual finish, rim, or lip treatments; do not bother to report fire polishing, as this is very common)

Applied handles — Handles formed from a separate gather of glass and applied to an object. The alternative method is found on pressed objects where the handles are formed in the mould with the main body of the object. This is technically difficult, however, and frequently the two items are pressed separately and the handle applied to the object.

Applied foot — Used for forms that do not necessarily have feet, such as tumblers, mugs/cups, pitchers, and so on. The foot is a separate gather and is applied to the base of the object.

Folded foot — The rim of the stemware foot is folded back on itself, usually by tucking it underneath.

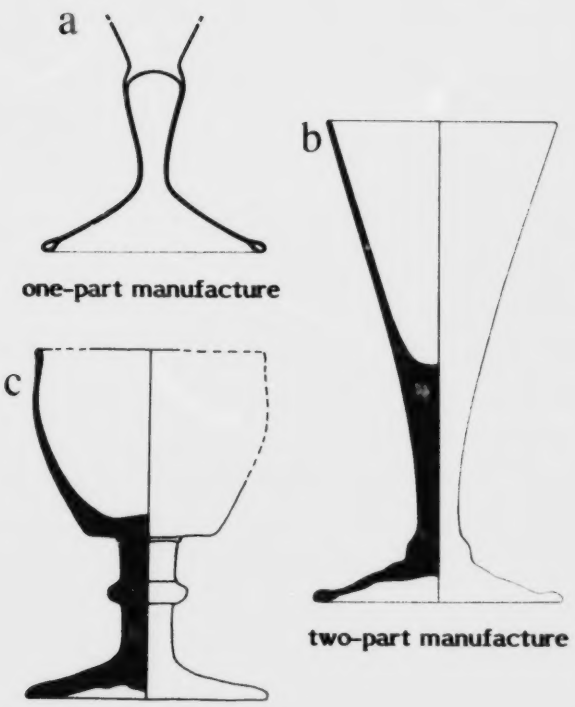


Figure 100. Stemware manufacture. (a) One-part manufacture. The entire object is formed from one gather of glass. (b) Two-part manufacture. The bowl and stem are formed from one gather of glass, the folded foot from another. (c) Three-part manufacture. Bowl, stem, and foot are formed from separate gathers of glass.

Pinched — Small solid glass objects, such as lustres, imitation precious stones, and parts of objects, such as "lemon-squeezer" feet (Fig. 14b), could be made by press moulding or pinching hot glass between two mould halves on long handles. These objects were often then touched up on a cutting wheel to eliminate the ruffled appearance of the glass from contact with the mould.

Ground resting point — Frequently found on pressed panelled tumblers with a pronounced basal concavity. The resting point is made into a flat smooth surface by grinding and then polishing. Other heavily pressed objects such as ink wells may also have this feature. (Not illustrated.)

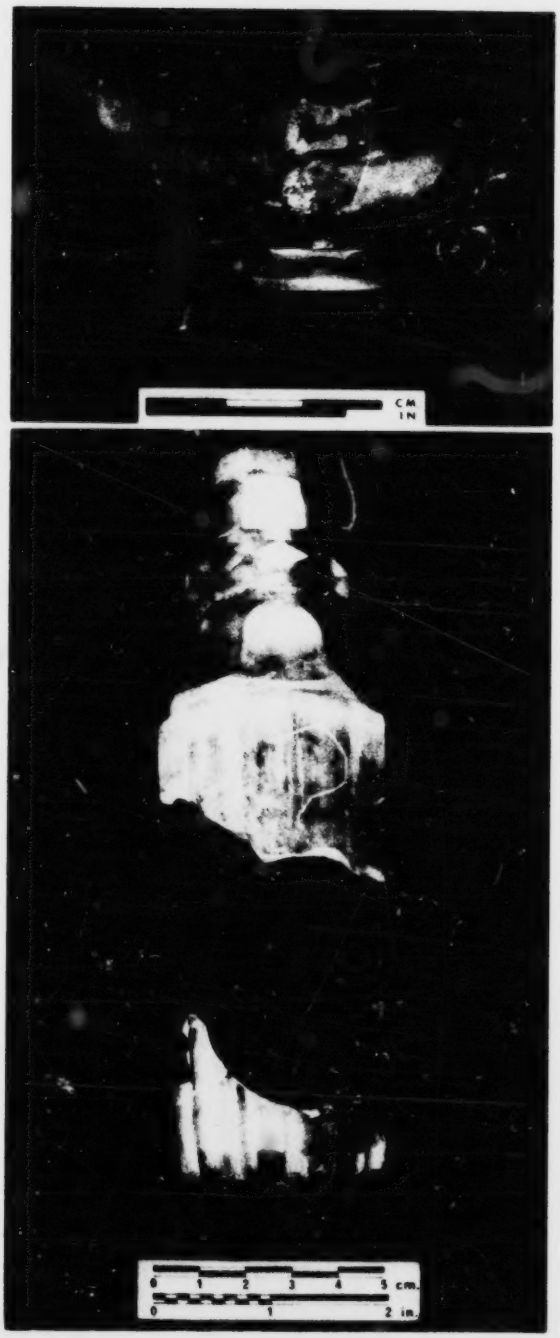


Figure 101. (a) Cup with applied handle, most of which is now missing, and applied foot. (b) Castor with body shaped by cutting.

Cut — The exterior body form is made by cutting away the surface of the object. Square decanters for wooden cases are often formed this way. In this instance the cutting cannot be considered "decoration" but is part of the method of forming the object.

Base

In the 18th and early-19th centuries the method of dealing with the pontil mark appears to have association with the country and date of manufacture. The presence/absence of the pontil mark, which is such a primary dating feature for containers, is more difficult to deal with in tableware manufacture. There were tools similar to the snap case for holding stemware and presumably tumblers. However the time frame for the change in table glass manufacture is much broader and appears to be largely undocumented. It is strongly suggested that the 1850-70 changeover period given for container glass is *not* applicable to tableware.

Unfinished pontil mark — As many tableware items have the pontil mark ground away, when the pontil mark is left "unfinished" this fact is of interest.

Finished pontil — The pontil mark is ground away and polished, leaving a smooth shallow concavity.

Roughly ground pontil — On some 18th century non-lead tumblers a cursory attempt has been made to grind away the pontil mark. The surface greyish-white and scratched, and often bits of the pontil mark still remain. This technique appears to be Continental in origin.

Finish

Firepolished lip or rim — The edge of the object is exposed to heat and the glass softens and forms a smooth rounded bead. This is the commonest way of finishing tumblers, bowls, and so on and it is unnecessary to record it.

Cut lip or rim — When the lip or rim is formed by cutting and polishing this can be noted. It is an alternative method of firepolishing. Cutting the lip or rim can also be done as a decorative technique. Ground lip, ground bore, ground neck, and folded lip are all described in Container Description.

Figure 102. Pontil marks on tableware. (a) Unfinished pontil mark. (b) Finished pontil mark. (c) Roughly ground pontil mark.

COMMERCIAL MARKS

Commercial markings found on tableware are generally those of the manufacturer. The commonest methods of marking are embossing, paper labels, acid etching, and engraving (see Commercial Marks in Part I).

DECORATION: TABLEWARE

The adornment or embellishment of an item of glass tableware is considered one of its most important aspects (see Glassware Decoration in Part I, Figs. 32-51). Decoration for different time periods can help in the

Table 4. Decorative techniques

A.	With hot glass	1.Colour
		2.Moulding
		3.Inclusions — air bubbles
		— air twist
		— opaque twist
		— mixed twist
		— spangled
		— silveria
		4.Superimposed glass — threading
		— banding
		— rigaree
		— quilling
		— prunts
		— chain
		— nipt diamond waies
		— partial casing
		— gadrooning
		— casing
		— mottled
		5.Misc. hot glass treatments — crackle glass
		— incised twist
		— Lynn glass
		— die impressed
		— twisted glass
B.	With chemicals	1.Acid etching
		2.Iridescent glass
C.	With abrasives	1.Diamond point engraving — stippling
		— scratching
		2.Surface wheel engraving — shallow
		— relief
		— intaglio
		3.Cutting
		4.Sand blasting
D.	With adhesives	1.Gilding
		2.Enamelling
		3.Painting
		4.Staining
		5.Silvered glass

identification of an item's country of origin and date of manufacture, and can be an indication of the relative cost of the item.

Decoration is an embellishment of the form but the form itself should not be considered as decoration, e.g. the shape of stemware bowls and decanter bodies, the knops and balusters on stems, the presence of neck rings on "three-ring" decanters, and handles on cups, pitchers, etc., are part of the form or shape of an object and although they are an integral part of the aesthetic appeal of the object they should not be considered as decoration.

These different areas of an object can themselves be decorated: decanter neck rings can be cut or annulated; knops can be cut; stems can have air or enamel inclusions; bowls can have cut or pressed motifs; glass can be added to embellish a form through bands and trailing. The possibilities of decoration, or "embellishment," are endless and it may sometimes be difficult to distinguish between "form" and "decoration."

The most common methods of decoration and the most commonly occurring geometric motifs are described briefly in Glassware Decoration in Part I. If the decoration is complex, try to locate a similar example in a published source (particularly when pressed patterns are involved). Failing that, use a photograph or drawing of the object rather than trying to describe it in detail. This description takes too long and the results tend to be confusing.

When describing or discussing decoration on glass tableware consider the following aspects: method of decoration; location of decoration; motif and number of times it is repeated. Examples: 8 cut panels on lower part of body; pattern-moulded ribs on bowl, incised spiral lines on stem; outer surface of plate is covered in pressed lacy design called "peacock eye" (Lee and Rose 1948: Pl. 113); pressed pattern on body consists of stippling, flowers, horizontal ribs, and vertical ribs (this pattern is too complicated to describe; have it drawn or photographed); engraved swags with cross-hatching, small floral motifs, and flowing lines around rim of tumbler; 16 moulded vertical ribs around base, in staggered lengths in repeating patterns, which go partway up the body.

SUBCATEGORY

Bowl

A bowl is a deep open vessel tending to be wider than it is high, and having a flat or footed base. It comes in a variety of sizes and may be used for a variety of purposes such as

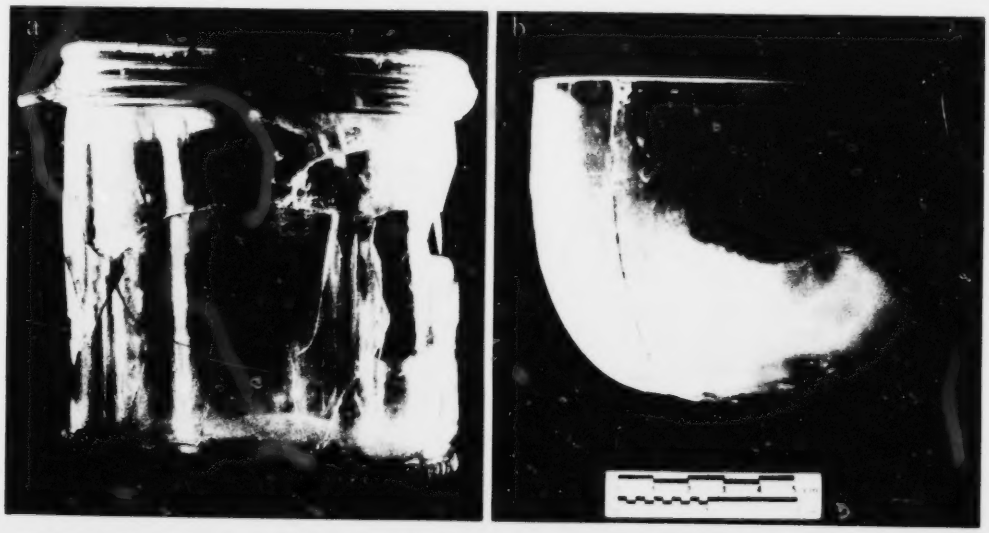


Figure 103. Bowls. (a) Wine glass cooler: continental, mid-18th century, demi-lead glass. The bowl has pattern-moulded ribs, a decorated band around the rim, and an applied rigareed band of glass at the heel. (b) Finger bowl or wine glass cooler: English, lead glass, early-19th century.

Table 5. Category: Tableware

Subcategory	Article examples	Popular name
Bowl	Finger bowl, sugar bowl	
Carafe	Commercial container	
Cruet/castor	Cruet, castor, indefinite, commercial container	
Decanter	Commercial container	Prussian style, ship's decanter etc.
Dessert glass	Commercial container	Jelly glass, etc.
Mug/cup	Mug, cup	
Pitcher	*Broc*, ewer	Creamer
Plate	Cup plate	
Salt and salt liner		
Stemware	Drinking glass	Firing glass, rummer-goblet, *verre-fougère*
	Stemmed serving vessel	Footed bowl, salver, celery vase
Tumbler	Commercial container	
Misc. tableware	Tray, dish, egg cup, vase, etc.	
Indefinite	Handle, cover, etc.	
Undiagnostic	(Misc. sherds of table glass, burnt, etc.)	
Unidentified		

serving food, mixing food, or holding water at the table. It may have a cover.

Finger bowl – Also called "wine glass cooler" and "wine glass rinser." One of the more common bowl forms found on 18th and early-19th century sites. The bowls appear to have been filled with water and are frequently seen in period paintings with stemware upended in the bowl.

Sugar bowl – A small bowl used for sugar, often covered.

Description – Describe the following parts: COVER; RIM; BODY; BASE; FOOT or FOOT RING.

Suggested measurements - RIM DIAMETER, BASE or RESTING POINT DIAMETER, VESSEL HEIGHT (from table to rim),

BOWL HEIGHT, FOOT HEIGHT, COVER HEIGHT, and COVER RIM DIAMETER, all in millimetres; CAPACITY, in millimetres.

Carafe

Carafe — These can easily be confused with decanters. Generally carafes have a shorter neck and wider mouth than do decanters. They may not have a stoppered mouth or associated grinding. They range from plain to highly decorated. Carafes can be used for wine or water, on the table or in the bedroom, and in the 19th century often had a tumbler inverted over the neck of the carafe. The implication is that they are used by one or two individuals. Terms used in English language price lists, etc., to refer to carafes are water bottle, carafon, water "crafts."

Commercial container — Carafes may also serve as commercial containers; certain Canadian wines are sold in bottles of a carafe shape and are obviously intended for subsequent re-use as carafes.

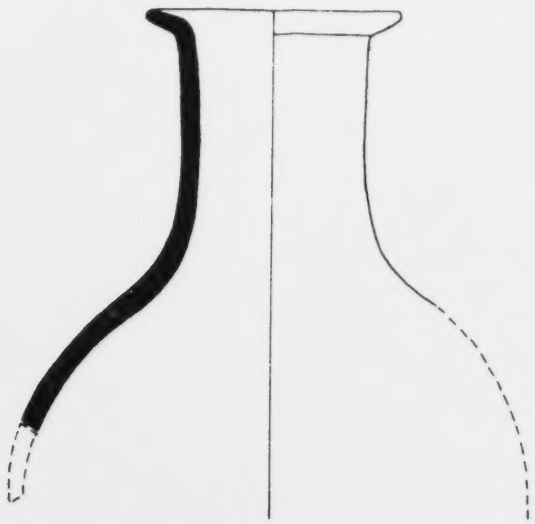


Figure 104. Carafe. Note the short, wide neck and the absence of grinding in the bore.

Description — Describe the following parts using container terminology as a guide: BORE; LIP; NECK; NECK RINGS(if present); SHOULDER; BODY; BASE.

Suggested measurements - BORE DIAMETER, VESSEL HEIGHT, and BASE DIAMETER, all in millimetres; CAPACITY, in millimetres.

Cruet/Castor

These two terms are used inconsistently in the literature and by glassmakers to refer to the set of small bottles used for condiments at the table and often found in a stand of some sort. This is sometimes called a cruet stand or a set of castors in a cruet stand. Because of this confusion, if there is no clear indication as to which type of vessel is represented the combined term can be used. In the mid-19th to early-20th centuries the bodies are often specifically adapted for fitting into metal stands.

Cruet — Is a small stoppered bottle used for liquids such as oil, vinegar, soya sauce, mint sauce, etc. It should have a pouring lip of some sort. In comparison to the castor, the cruet is more likely to have a handle and less likely to have a separate attached top. The cruet may or may not have a ground bore and stopper.

Castor — Is a small tableware bottle with an attached, perforated top for sprinkling or shaking condiments such as sugar, peppers, etc., on food. Because these bottles always have an attached top (often of glass or metal) there should be evidence on the exterior surface of the neck of provision for this attachment, such as grinding, threads, or a plain unfinished neck.

Indefinite — When there is no clear indication as to whether the vessel is a castor or cruet, particularly a problem with base fragments, "indefinite" can be used.

Commercial container — A cruet or castor that has been sold filled with a product and was obviously intended for subsequent re-use as a castor or cruet.

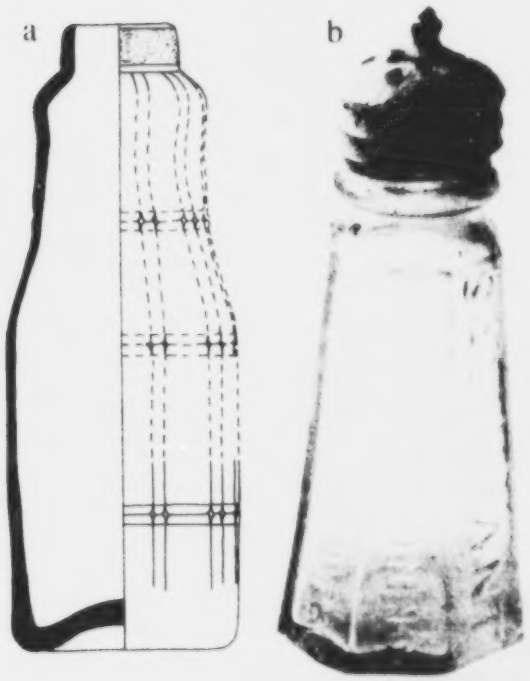


Figure 105. Two castors. (a) Has been decorated by cutting and pattern moulding to resemble a barrel. The neck has been ground on the exterior to accommodate a fitment of some sort. (b) Is a mould-blown commercial container with a metal sprinkler top.

Description — Describe the following parts, using container terminology as a guide: BORE; LIP; NECK; NECK RINGS; SHOULDER; BODY; BASE.

Suggested measurements - VESSEL HEIGHT and BASE or RESTING POINT DIAMETER, both in millimetres; CAPACITY, in millilitres.

Decanter

A decanter is a narrow-mouthed vessel used for serving and/or storing alcoholic beverages. It should occur in sizes related to liquid measures associated with alcohol. A decanter has no pouring spout, but should have had a stopper (early 18th century examples may not have had a stopper) and may have associated grinding in the bore. Decanters are often decorated and occur in a variety of body shapes. English or Anglo-Irish decanters of the ca. 1700 - ca. 1830 period are well covered in the literature on English table glass. Popular names such as "ship's decanter," "Prussian" style, etc., which describe body shape can be found in these sources. Cite references used.

Three-ring decanter — Many decanters of the Anglo-Irish period (ca. 1780-ca. 1840) have three neck rings, hence the use of the term.

Commercial container — Decanter forms sold containing products and designed for re-use as decanters.

Description — Describe the following parts, using container terminology as a guide: BORE; LIP; NECK; NECK RINGS; SHOULDER; BODY; BASE.

Suggested measurements - VESSEL HEIGHT and BASE or RESTING POINT DIAMETER, both in millimetres; CAPACITY, in millilitres.

Dessert Glass

Dessert glass — Individual serving dish used for various types of desserts, e.g. sweetmeats, jellies, syllabubs, custards, and "ices." Specialized forms include small shallow dishes, small handled cups with feet, footed glassed with tall slender bowls (sometimes with one or two handles) and a rudimentary stem or no stem at all (Fig. 107), and footed glasses with stems resembling those on stemmed drinking glasses (Elville 1961: 175-76). Sometimes the rims are flared or decorated. Dessert glasses were available in sets and are still made.

Commercial container - As with other tableware forms, glasses may have been sold originally with contents and been intended for re-use as dessert glasses.

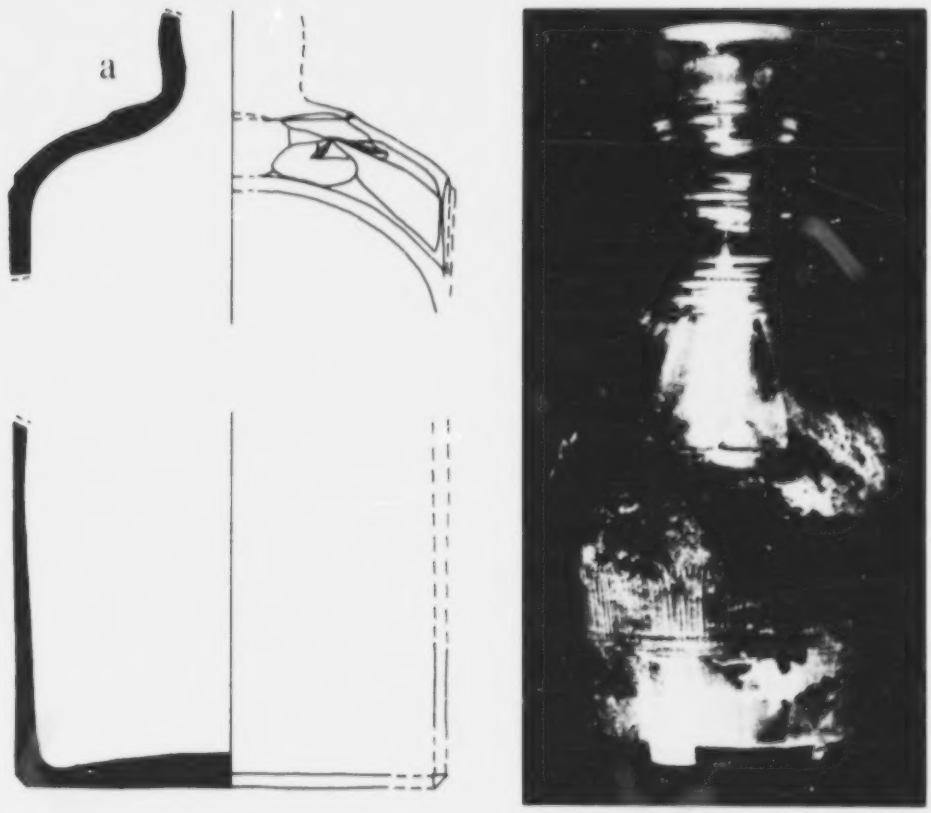


Figure 106. Two decanters. (a) Square decanter with cut sides and base and facet-cut decoration on the shoulders. (b) Prussian-shaped decanter, flanged lip and ground bore, three triple neck rings, cut panels on shoulders and lower body, narrow cut flutes on body.

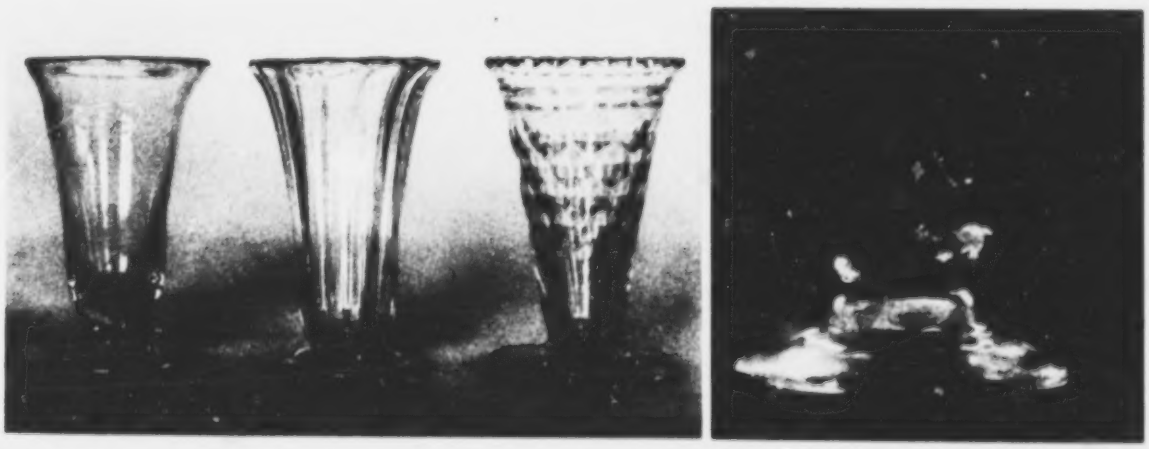


Figure 107. Dessert glasses. This form is usually called jelly glass.

Description - Using stemware terminology describe the following parts: RIM; BOWL or BODY; STEM; FOOT.

Suggested measurements - BOWL or TOP RIM DIAMETER, TOP or BOWL HEIGHT, STEM HEIGHT, FOOT RIM DIAMETER, and VESSEL HEIGHT, all in millimetres; BOWL CAPACITY (brimful), in millilitres.

Mug/Cup

These are handled drinking vessels or individual serving vessels with or without a foot. It is often difficult to distinguish between mugs and cups when only fragments are present.

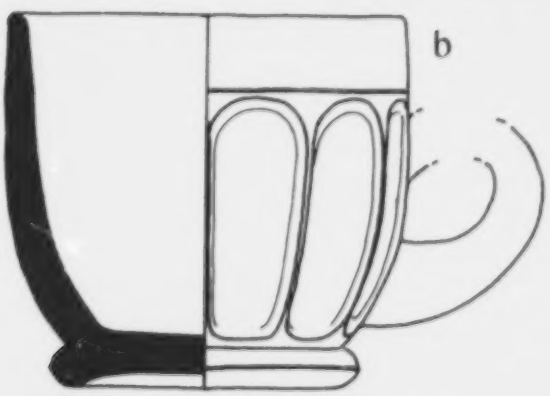


Figure 108. (a) Cup with cut panels on the body and foot and an applied handle, most of which is missing. (b) Press-moulded punch cup, 20th century Canadian manufacture.

Mug — A larger vessel than a cup, in glass it is basically a tumbler form with a handle. It is almost always a drinking vessel and is infrequently found on our sites.

Cup — A smaller vessel than a mug. It is not always for drinking but was also used as part of a dessert set for custards and occurs more frequently on our sites than do mugs.

Description — Describe or illustrate the shape of the following parts: BODY; BASE; FOOT; HANDLE.

Suggested measurements - RIM DIAMETER, BODY HEIGHT, BASE or FOOT DIAMETER, VESSEL HEIGHT, and HANDLE LENGTH, all in millimetres; CAPACITY (brimful), in millilitres.

Pitcher

A pitcher has a pouring lip or spout, a handle, and a comparatively wide opening (too

Figure 109. Small press-moulded creamer in "Nugget" pattern (Stevens 1967: 128). The handle is missing.

large for a stopper). The term is used to describe a variety of sizes and includes such things as ewer, jugs, creamer, and *broc*.

Creamer — A popular name used to describe a small pitcher used for cream, syrups, sauces, etc.

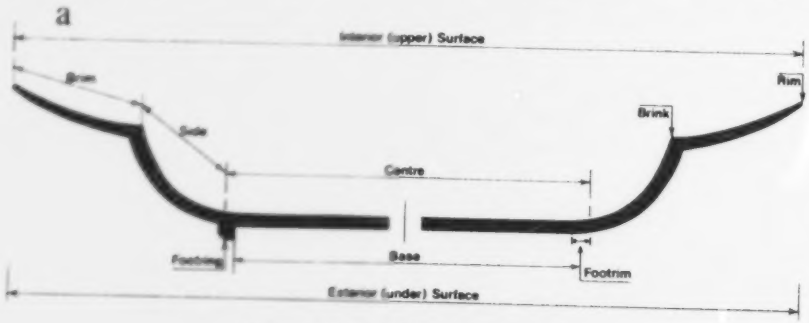
Description — The following parts should be described or illustrated: SPOUT; RIM; BODY; BASE/FOOT; HANDLE.

Suggested measurements - VESSEL HEIGHT and BASE or FOOT DIAMETER, both in millimetres; CAPACITY, in millilitres.

Plate

A glass plate is a shallow, usually circular, dish used as a serving vessel, underneath another dish for catching spills and, infrequently, for eating. Prior to the development of pressed glass in the 19th century, plates were not commonly made out of glass. They became increasingly common during the 19th century and the 20th century.

Cup plate — A small plate, generally 3-4 inches (70-100 mm) in diameter, supposedly designed to hold a cup while someone



Parts of a Plate (Terminology)

Figure 110. (a) Plate nomenclature (reproduced by permission of D.M. Griffiths). (b) Press-moulded cup plate in lacy pattern.

drinks tea out of the saucer. Cup plates in glass began appearing in the 1820s.

Description — Describe the following parts as deemed necessary: RIM (edge of the plate); BRIM (area between the rim and the brink); SIDE; CENTRE; FOOT RING; BASE. Glass plates are found infrequently on archaeological sites. For elaborately decorated examples it is probably easier to locate an illustration of a similar one in a printed source or to have the artifact drawn or photographed than to spend a lot of time describing the plate in detail. Decoration on plates is of primary importance.

Suggested measurements - RIM DIAMETER and VESSEL HEIGHT (from table to rim), both in millimetres.

Salt and Salt Liner

Salt and salt liner — Salts occur in a tremendous variety of shapes and are chiefly recognizable by their small size. They tend to be shallow, open vessels, to be highly decorative, and in the 19th century were often novelty items. Salts were usually used by one or two people at table. The salt is spooned out, not shaken. A salt liner is a plain glass object, often coloured, designed to fit into a metal salt.

Description — No specific guidance can be given for their description as they occur in such a variety of shapes. Terminology and parts suggested in other areas of the glossary can be used for guidance.

Measurements — As shapes and sizes vary so much, measurements should be left to the discretion of the cataloguer; some indication of size is desirable.

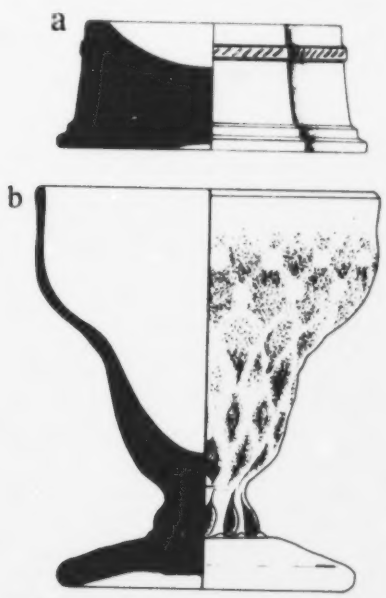


Figure 111. Salts. (a) Trencher salt, cast and overcut. (b) "Bonnet" glass with pattern-moulded, ogee-shaped bowl, a rudimentary stem, and applied plain conical foot. Dating from the second half of the 18th century, this form is considered by some to be a dessert glass.

Stemware

This is a general term used for vessels consisting of a foot, a stem, and a bowl. Stemware comes in a variety of shapes, sizes, and proportions and was intended for a variety

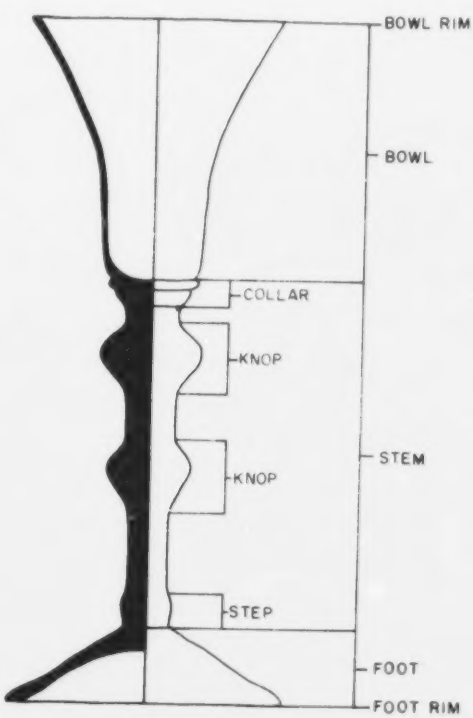


Figure 112. Stemware nomenclature.

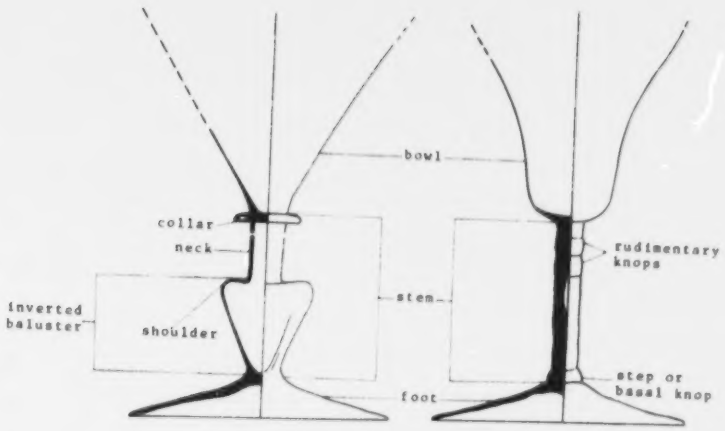


Figure 113. Stemware nomenclature for *verre-fougère*.

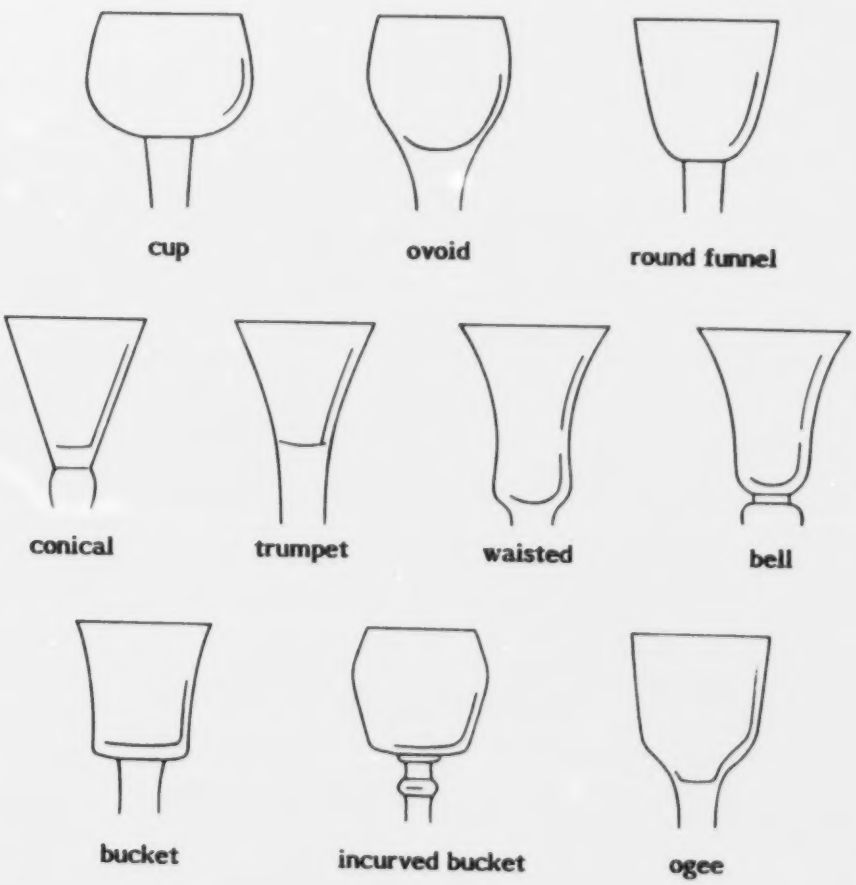


Figure 114. Nomenclature for commonly occurring bowl shapes (based on Haynes 1959: 194-95, 198).

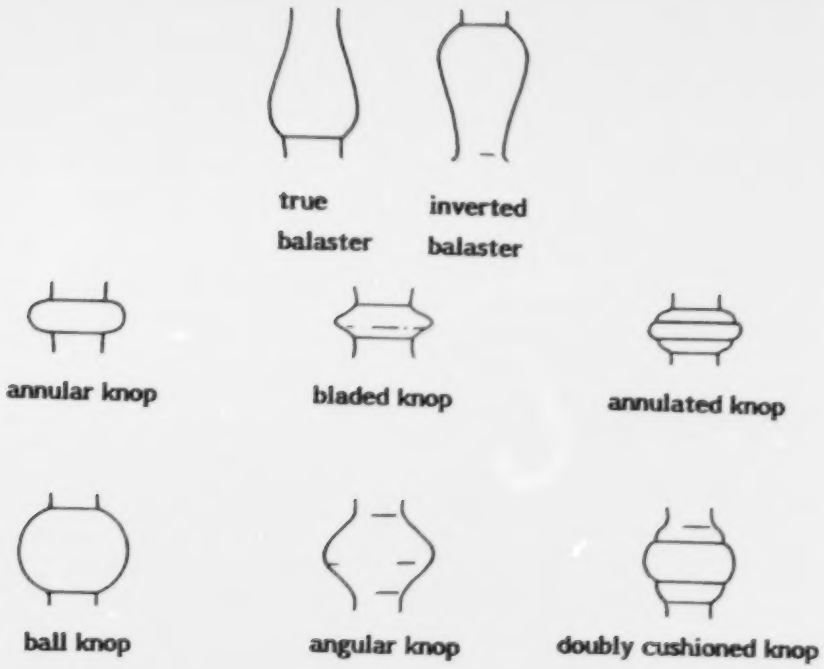


Figure 115. Nomenclature for commonly occurring stem formations (based on Haynes 1959: 202-3).

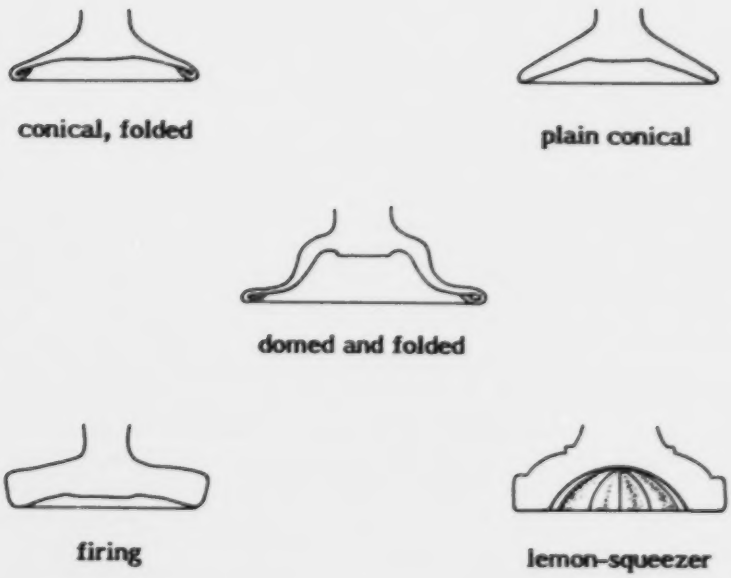


Figure 116. Nomenclature for commonly occurring foot formations (based on Haynes 1959: 199).

of uses, such as drinking glasses, dessert glasses, serving dishes, and lighting devices. Stemware is a common tableware form on archaeological sites.

Description — Using stemware terminology from Haynes (1959) describe the following parts: RIM; BOWL or TOP; STEM; FOOT.

Suggested measurements - BOWL or TOP RIM DIAMETER, TOP or BOWL HEIGHT, STEM HEIGHT, FOOT RIM DIAMETER, and VESSEL HEIGHT, all in millimetres; BOWL CAPACITY (brimful), in millilitres.

DRINKING GLASS

Drinking glass — Stemware can be called a drinking glass when there is a degree of certainty that the object was intended as a drinking vessel, as for example when a section of the bowl has been identified. Although the majority of the stemware from our sites appears to be drinking glasses, it should be kept in mind that stemmed lighting devices and dessert service pieces can be confused with drinking glasses. In the voluminous literature on 18th and 19th century English table glass, mention is of-

rummer goblet

firing glass

stemware drinking glasses

Figure 117. Stemware forms.

ten made of stemware forms intended for specific beverages such as ale, champagne, claret, wine, gin, mead, and so on, and it is clear from contemporary literature that there were some differentiated stemware forms. Unfortunately the definitions of these forms are not consistent. Identification of these defined types from archaeologically retrieved vessels is generally frustrated because the types are defined on the basis of bowl size, and bowls are the least commonly recovered part. Furthermore it would be dangerous to assume that identified types, e.g. a "claret wine," were used only for the purpose intended. Therefore attempts at correlating stemware forms with specific types of drinking vessels and beverages consumed should be limited to what can be backed up with documentation.

Firing glass — A popular name for a glass having a short thick stem, a thick heavy flat foot, and, usually, a conical or trumpet-shaped bowl. A popular English glass form in the second half of the 18th century.

Rummer-goblet — A popular term for a glass with a capacious ovoid, conical, or bucket-shaped bowl. The bowl is higher and wider than the stem-foot portion of the vessel. Its stem is short. Typical of the form is a swelling step at the base of the stem and/or a sharp-edged collar under the bowl. The foot is larger than feet on wine glasses. This is an Anglo-Irish glass form beginning to appear in the 1770s. It continues to be a popular form.

Verre-fougère (Fig. 113) — This is a general term referring to delicate, thinly blown stemware objects from the first half of the 18th century, and possibly earlier. The glass varies in colour from yellow-green to blue-green, blue, mauve, and grey. The stem forms vary but are usually either hollow-blown or very slender with air inclusions. Generally considered to be of French manufacture.

STEMMED SERVING VESSEL

Stemmed serving vessel — These are large serving vessels with a foot, stem, and top, and designed to serve more than one person.

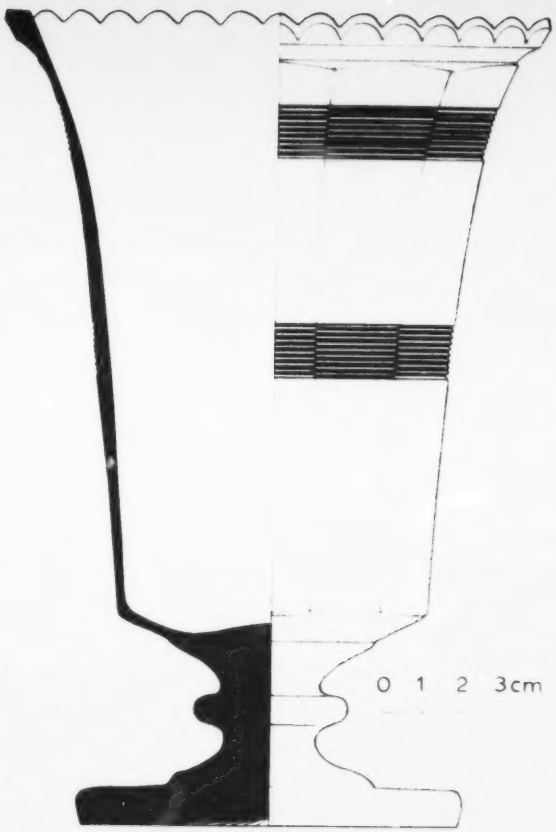


Figure 118. Stemmed celery vase, cut decoration on body and at rim; stem has collar, annular knop, and step at the foot, cut starburst on flat underside of foot.

Footed bowl — A term used to cover such things as large sweetmeats, compotes, comports, and tazzas. The stemmed serving vessel has a bowl-shaped top and may or may not have a cover.

Salver — The stemmed serving vessel has a flat top, i.e. it resembles a tray on a pedestal. Used in pyramids in the 18th century and later as a cake stand.

Celery vase — This term is used for stemmed serving vessels having large bucket-shaped tops. The top is almost a tumbler shape.

Tumbler

Tumblers are a commonly recognized drinking vessel of simple form, varying in shape and quite markedly in size. They generally have a flat or shallow concave base, a plain rim, and a circular horizontal cross section. Vertically the tumbler can be cylindrical, tapered, flared, or barrel-shaped. Occasionally tumblers with a foot are found.

The tumbler is the most frequently occurring table glass form found on archaeological sites in Canada.

Commercial container — The tumbler can be sold originally filled with contents such as peanut butter, jelly, mustard, and so on but is intended to be re-used as a tumbler. It is the table glass form used most frequently as a commercial container.

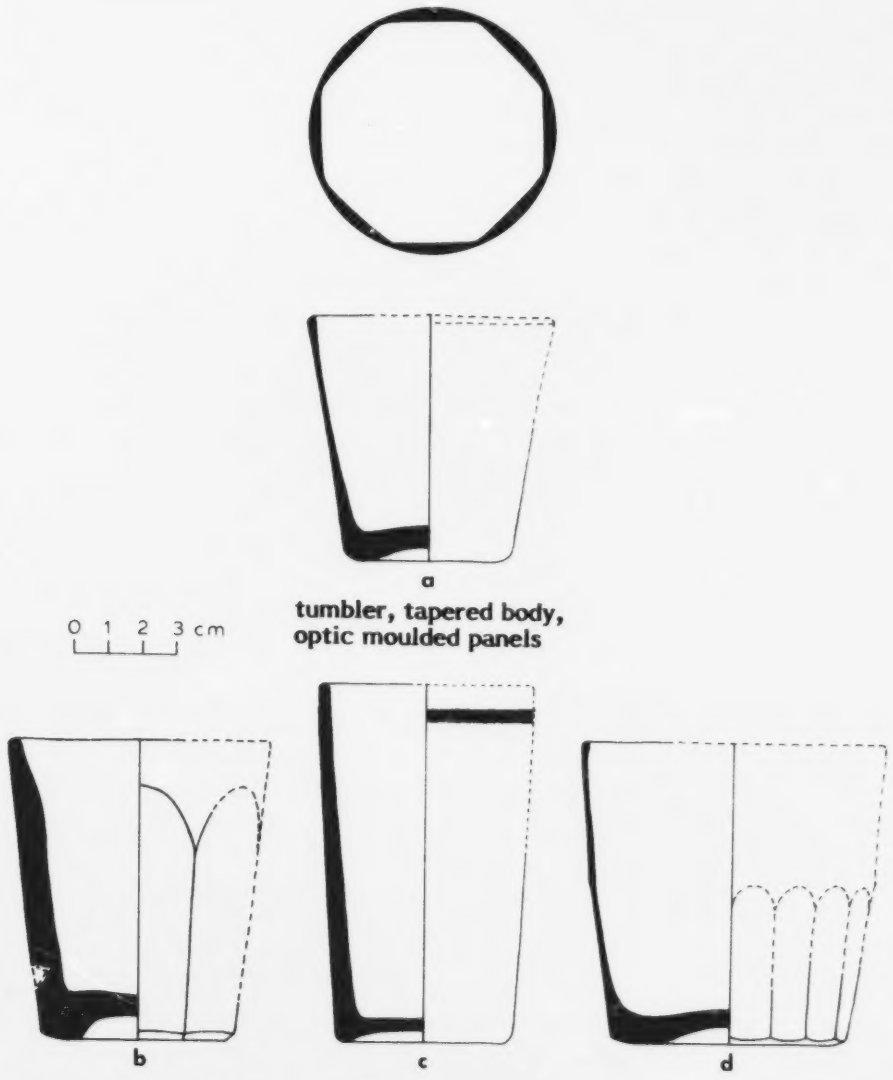


Figure 119. Tumblers.

Description — Describe or illustrate the shape of the following parts: BODY (barrel, cylindrical, tapered, waisted, or flared if enough of the body is present to be sure); BASE (terms should be taken from the container section); FOOT.

Suggested measurements - RIM DIAMETER, BASE DIAMETER, and VESSEL HEIGHT, all in millimetres; CAPACITY (brimful), in millilitres.

Miscellaneous Tableware

There are a host of other tableware forms but as they have in the past been found infrequently or in very small quantities on archaeological sites, no attempt has been made to itemize them at great length. There is a large body of literature on table glass and table glass forms although it is uneven in its coverage. A number of very useful catalogue reprints and books containing large numbers of catalogue illustrations dealing with the late-19th and early-20th century North American production have been published in recent years; these are an invaluable guide to the tableware of this period.

When cataloguing or discussing material of this sort, the shapes of the various parts and the size of the object should be considered as well as the manufacturing technology, the decoration, and the commercial markings. It should be noted that terms used for ceramic and glass tableware items are not always comparable.

Some of the miscellaneous tableware forms that may be encountered are tray, dish, stand, egg cup, nappy, vase, knife rest, napkin ring, porringer, and posset cup.

Figure 121. Indefinite tableware. A handle which could have been attached to the body of one of several types of tableware objects.

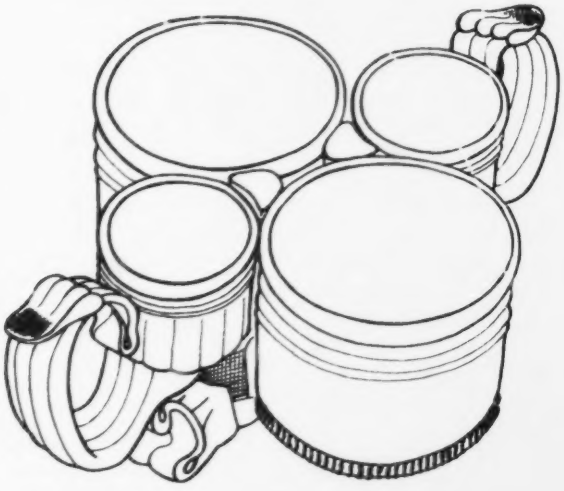


Figure 120. Miscellaneous tableware. A pattern-moulded cruet stand with two large sections to stand cruet bottles and two smaller wells for salt and another condiment.

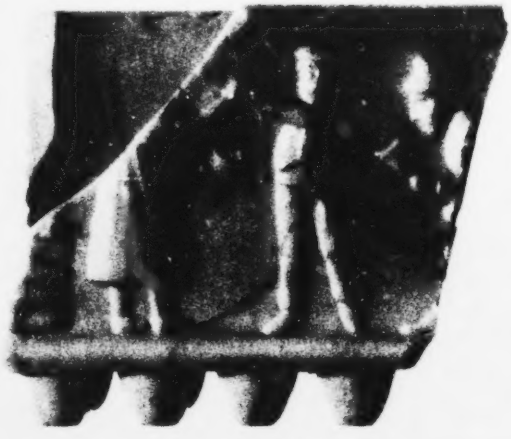


Figure 122. Unidentified tableware. A small press-moulded, opaque blue glass dish, for which a use cannot be definitely assigned at the moment.

Indefinite

Can be used for glass tableware artifacts or pieces of artifacts that cannot be assigned to a specific type of vessel or could belong to several types, e.g. handles, finials, covers, spouts. Generally feet or stem fragments should be assigned to "stemware."

Undiagnostic

A term used for miscellaneous fragments of tableware whose function cannot be determined because of the sherd's small size or burnt condition.

Unidentified

The term to describe glass artifacts whose function cannot be determined at the moment but which have the *potential* for identification. The items are unfamiliar to the research staff. The term should *not* be used for non-descript fragments of glass.

PART IV. CLOSURES

CATEGORY

Closures — Closures are separate items used to cover the mouth of a vessel to protect the contents from dust, spilling, evaporation, and, sometimes, to exclude the air completely. Closures can be strictly functional, e.g. a wad of paper stuffed into the mouth of a bottle, or they can combine beauty with utility. Closures for glass tableware items tend to be limited to stoppers for decanters and cruets, fitments such as sprinklers and spouts for castors, and covers for tumblers, bowls, and stemmed drinking glasses. Closures for containers are much more varied and include stoppers, lids, caps, fitments such as sprinklers, sifters, sprayers, spouts, droppers, and pour-outs, as well as some complex patented closures.

SUBCATEGORY

Stoppers

A stopper is a plug which is inserted into the neck of a vessel to effect a seal from within the vessel. The stopper types discussed below are those that occur most regularly on our sites. Some specialized or unusual stoppers, e.g. glass balls, which are found less frequently will be discussed in Patented Closures.

CORK

Cork is the bark of the cork oak tree. Cork's ability to resume its original size and shape after compression makes closures of this material effective seals. Closures of cork can take three distinct forms: cork can be used as a stopper on its own; shell cork as a disk or in a sheet can be added to another type of closure; a cork stopper can be hollowed out and used as the medium by which a fitment is inserted into the mouth of an object, e.g. sprinklers.

Cork as a stopper seems to have become a standard closure for small-mouthed containers beginning in the 16th and 17th centuries, supplanting other sealing substances and maintaining its supremacy almost to the present day. The demand for good quality cork stoppers encouraged a large-scale industry in Spain and Portugal to produce these items. However large pieces were too expensive and difficult to obtain for cork to be used commonly as a stopper for large-mouthed jars.

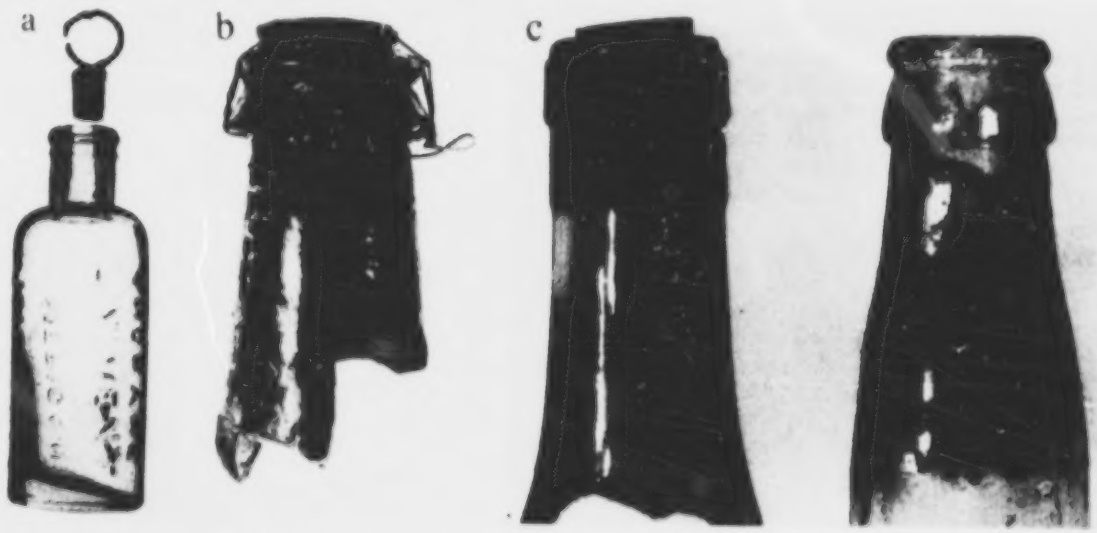


Figure 123. Cork closure. (a) Medicine bottle with cork closure and cork ring for removing the stopper. (b) "Wine" bottle neck with cork wired in position. (c) Two bottle necks, both of which were originally stoppered with cork and encased in a capsule.

Cork stoppers can be cut from a single block of cork, several strips of cork can be glued together to form the stopper, or, after the beginning of the 20th century, the stopper can be made of composition cork (see Nurnberg 1967: 13-14). Its shape can be cylindrical or tapered; some authorities feel that the tapered shape is earlier, the cylindrical requiring a special tool for its removal and thus dating after the invention of the corkscrew sometime in the 17th century (Gilbey Ltd. 1957: item 316).

Sealing practices involving cork stoppers can include a proprietor's brand stamped on the cork, wire or packthread to secure the cork, a grey metal or foil capsule, or wax, or composition with or without an impressed seal, to cover the cork. In addition, in the late-19th and early 20th centuries druggists' bottles stoppered with cork were often sold with a single-use cork ring, which, once inserted into the cork, acted as a handle for the stopper. Cork stoppers with composition heads were also available during the 19th century and are still used, plastic having replaced the composition.

Cork is not usually used as a stopper for tableware items.

The term "cork" has come to be used generically but should not be employed without qualifiers to describe something that is not true cork.

Interesting aspects of a cork stopper found in a bottle neck include its length, which determines to some extent how full the bottle could have been, whether the cork is a single chunk or a series of strips, whether the cork was driven flush or only part way, whether or not the top of the cork was cut off after insertion, the shape of the cork (tapered or cylindrical), and the diameter, as it will be impossible to measure the bore of the bottle without removing the cork. Also interesting is any additional treatment like wiring or enclosing the cork in a capsule or wax. The presence of a composition head or a cork ring can also be noted.

SPRINKLERS, POWDER TUBES, AND SQUIRT TOPS

These are closure/dispensers that fit into a bottle neck to regulate and direct the flow of liquid or powdered contents out of the bottle. They consist of a hollow shank which is inserted into the bottle neck, a horizontal projection which acts as a ledge or stop to sit on the bottle lip, and a hollow tube which may or may not have a cap or plug. Illustrations of squirt tops and powder tubes in 19th century cataloques show them on table glass and commercial containers: cruets, sauce bottles, colognes, tooth powders, barbers' bottles, and essence and bitters bottles. The design of all types of squirt tops is very similar, although they can be composed of different materials and those used on bottles with rapidly evaporating contents often have a cap or plug for the tube (Whitall, Tatum & Co. 1971: 62; Antiques Research Publications 1968: 5; Pyne Press 1972: 28, 123; Maw 1913: 67, 485; Budde & Westermann 1913: 38, 84).

Some 18th century exampes of squirt tops in Parks Canada's collection are made of wood and have shanks large enough in diameter that

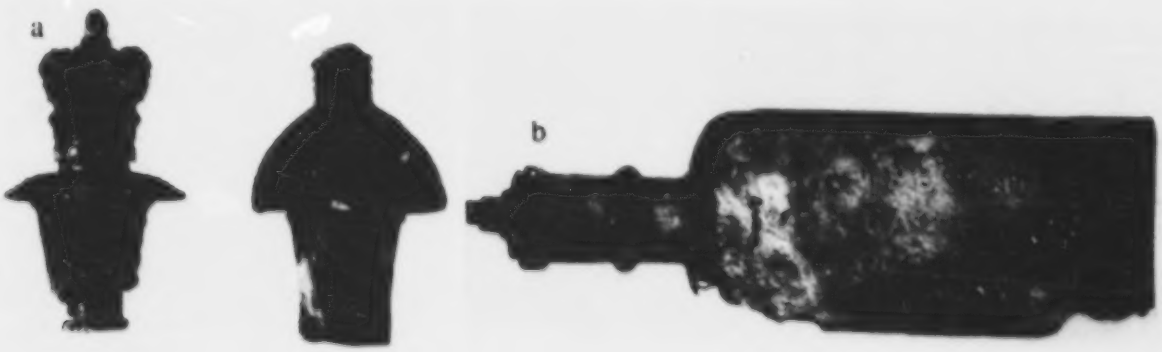


Figure 124. (a) Two metal sprinklers with shell cork on their shanks. (b) A bottle with its sprinkler in position.

Figure 125. Three stoppered glass bottles.

they may have been forced into a bottle with the intention that they not be removed; metal examples in Figure 124 have cork around a narrow shank and were probably transferable from one bottle to another.

GLASS STOPPERS

Glass stoppers consist of a shank, which is the plug, and a finial, the portion by which the stopper is grasped for removal. These two parts may be joined by a neck.

To prevent the stopper from slipping into the vessel, the shank may have screw threads to twist into place inside the neck or the finial portion of the stopper may rest on the lip of the container. If airtightness is desired in the closure, to prohibit evaporation for example, the shank may be ground to fit the bore or a strip of shell cork may be wrapped around the shank. An early reference to grinding glass stoppers is quoted by Helen McKearin (1971: 123) and dates from 1665. Loose or unground glass stoppers have been dated as early as 1500 B.C. (Holscher 1965: 467).

The finial portion of the stopper, if it is intended for an item of tableware or decorative glassware, may be decorated in a style complementary to the item; if for a commercial container the finial may have commercial markings, usually on its top.

Stopper shanks are usually tapered; their bottoms may be squared or rounded. This shape may be obscured by jagged glass or by a pontil mark.

Glass stoppers for tableware and decorative glassware items are not uncommon in the 18th and 19th centuries. Until 1841 they were individually manufactured; in that year an American mould was patented that allowed 10 stoppers to be press moulded at one time (Watkins 1942: 370). However, moulding the stopper was a minor part of the expense of production. Because each ground glass stopper is a unique fit to the bottle with which it is ground, manufacturing cost is rather high compared with other available types of stoppers; this restricted the use of glass stoppers for commercial containers. For example, in the 1880 Whitall, Tatum & Company catalogue prescription ware in the 1/2-ounce to 8-ounce

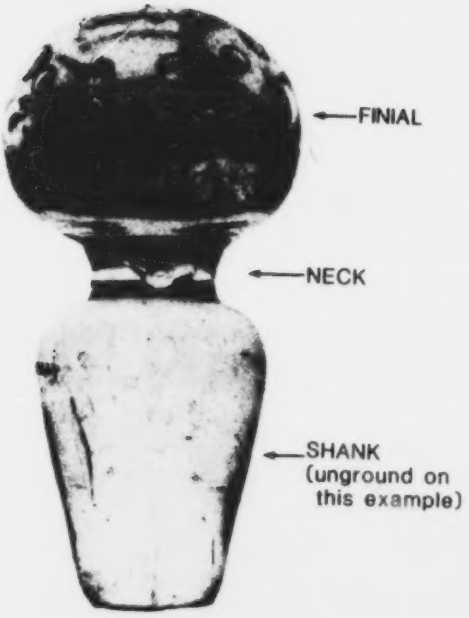


Figure 126. Glass stopper nomenclature.

sizes with ground stoppers were double or triple the cost of the bottles without stoppers (Whitall, Tatum & Co. 1971: 13). Glass stoppers found with commercial containers are usually not ground but fitted into a cork with a hole through its centre.

A glass stopper for a commercial container would be more useful than one of cork in a bottle of a product which was not to be used all at once, or in a bottle which could be or was intended to be reused, like a flask. A cork stopper removed many times would be inclined to break and require replacing. Glass stoppers are not likely to be associated with bottles whose contents were used all at once, e.g. small, single-dose medicines, beer and soft drink bottles (due also to the carbonation), and the majority of liquor bottles.

Glass stoppers should be described by the shape of the finial (using one of the standard shape names found on the following pages or a name from a catalogue or pattern book plus reference), the finial decoration, and any shank treatment, such as grinding, hollow blow, etc. As well, an indication should be given of the stopper's overall height and a shank diameter, a clue to the size of vessel mouth for which the stopper was intended.

Glass Stopper Shapes

"Club sauce," club sauce type — Although glass catalogues of the late-19th and early-20th centuries advertise for sale a variety of glass stopper shapes, by far the most commonly occurring on our sites is the club sauce type. This stopper is for small-mouthed commercial bottles. It has a circular top, horizontally oriented; there may be a depression in the centre of the top, sometimes with lettering (e.g. Lea & Perrins) around the depression, or the top can be flat without a depression or dome-shaped; the edge of the top is bevelled or rounded; the sides are flat; the underside of the top is flat. The shank is cylindrical for a distance, indicating the area which could be wrapped in shell cork, and the lower portion of the shank is tapered. There is no neck between the shank and the finial. Although this stopper shape is often found with associated sauce bottles or with embossing that identifies it as a sauce bottle stopper, it is suggested that the name be used with qualification, i.e. club sauce type. The same kind of stopper has been seen on bottles intended for toilet vinegar (Maw Son & Sons 1903: 169) and under a grey metal capsule marked "Scotch Whiskey." As well, Whitall, Tatum & Co. (1896: 8-9) advertise their "club sauce" stopper to fit bottles of 1/2 pint, pint, and quart capacity only (compared with stoppers which come in "all sizes" or those that fit bottles of capacities from 1/2 pint to 1/2 gallon), suggesting that true "club sauce" stoppers may be limited in size. Club sauce type stoppers have no such restrictions; those in our collections range in height from 24 to 37 mm. This stopper shape was one commonly used in commercial packaging, if the incidence of its occurrence on our sites is any indication. The flat top fits under a capsule almost as conveniently as a cork stopper and could probably have been wired or tied in position. As well, the top of the stopper has a large exposed area on which to emboss commercial marks. The shape has no inherent weak spots such as can be found on stoppers with necks, and club sauce type stoppers are often excavated intact.

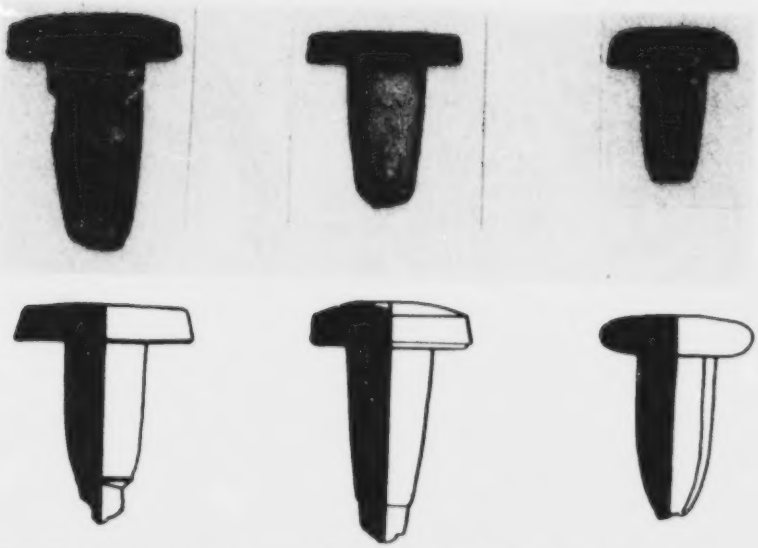


Figure 127. Six examples of club sauce type stoppers, with variations in size and shape. None of the specimens is embossed.

Eno's-type — This stopper is commonly found with Eno's fruit salt bottles, which have mouths that are larger than normal small-mouthed containers but smaller than jars. The stopper could be considered an enlarged version of the club sauce type in that it has a circular top, horizontally oriented, a tapered shank, and no neck. The Eno examples in the Parks Canada collection have a large flat circular depression in the centre of the top, embossed lettering on a raised band around this depression, and the sides of the top are flat. The shank is short and tapered. This stopper shape is sometimes called "mushroom" in druggists' catalogues, but that term is used in modern collecting literature to describe a fancy tableware stopper (Fig. 132) and should not be used to indicate a stopper for a commercial package.

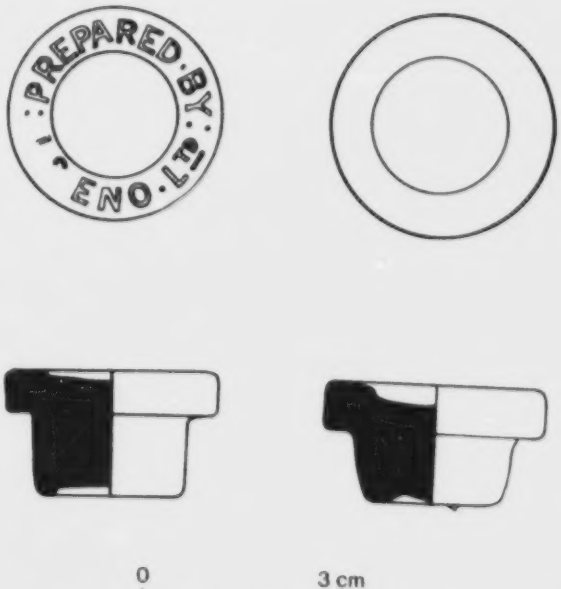


Figure 128. Eno's-type stopper.

Jar stoppers — This could be considered another, larger version of the club sauce type stopper. The wide raised band around the circular depression in the centre of the top often has embossed markings.

Flat oblong head stoppers — The finial is flat and rectangular and is vertically oriented; it may broaden slightly towards the shank or narrow to form a neck. The edges of the shank may be bevelled. If the top of the shank is wider than the finial, it forms a shoulder on which the finial sits. The five examples illustrated in Figure 130

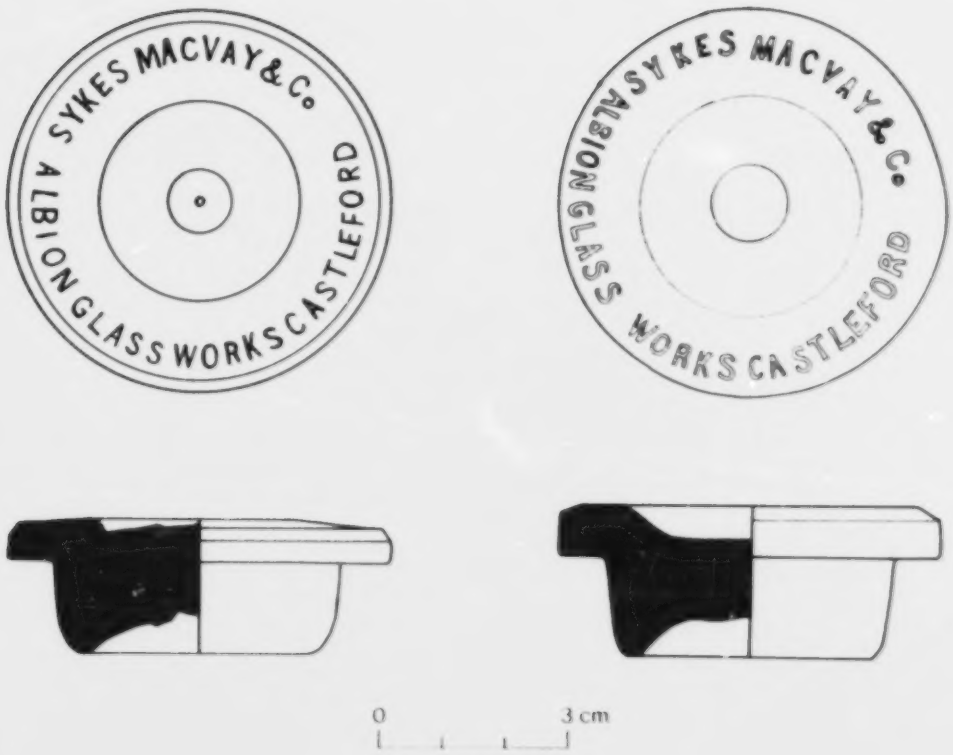


Figure 129. Jar stoppers.

Figure 130. Flat oblong head stoppers. The largest of these stoppers has a hollow shank; all five have ground shanks.

indicate a variety of bottle types for which this shape was made. Although it is not expected that this stopper style was used for tableware items, it figures prominently in the S. Maw 1913 catalogue of druggists' glassware for dispensaries, medicine chest bottles, and druggists' bottles (Maw 1913: 636-37, 61-65).

Figure 131. Ball stopper.

Ball stopper — The finial is round or roundish on all sides. The example in Figure 131 has been decorated by staining, has an unusually long neck, and a small mamelon on its top. Although this specimen was a decanter stopper, the shape was also used on commercial containers and display bottles, and is also called "globe" shaped.

Mushroom stopper — The flat or dome-topped finial sits horizontally on the shank or on a globular knop or on a neck. The name mushroom is also occasionally applied to stoppers for commercial containers which we prefer to call "Eno's-type" and "club sauce type." It is suggested that "mushroom stopper" is more commonly understood to describe the fancy tableware closure illustrated in Figure 132 than the commercial container variety. A very common decoration for mushroom stoppers in our collection is moulded ribs radiating from the centre of the top to the edge of the finial, forming a sunburst motif (see also McKearin and McKearin 1948: Pl. 114, No. 19).

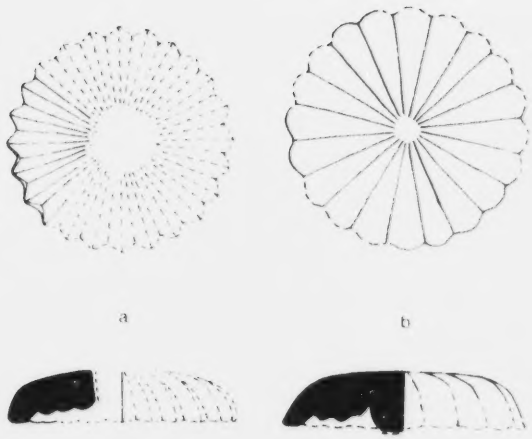


Figure 132. Mushroom stoppers.

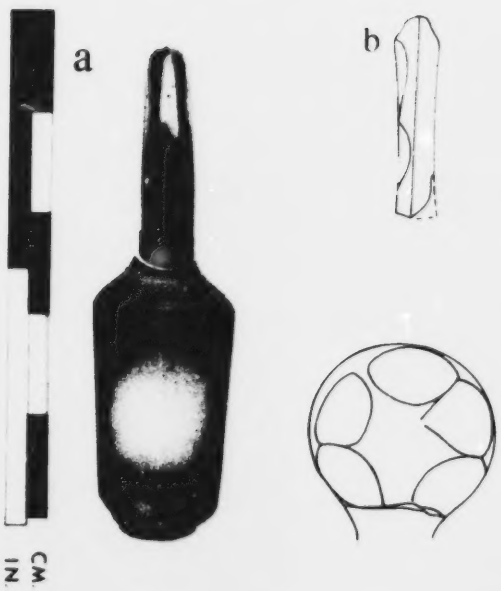


Figure 133. Disc stoppers. (a) A plain disc stopper with a ground shank. (b) A disc stopper decorated with cut facets.

Disc stopper — The finial is a vertical flat circle and the shape is also called "wheel."

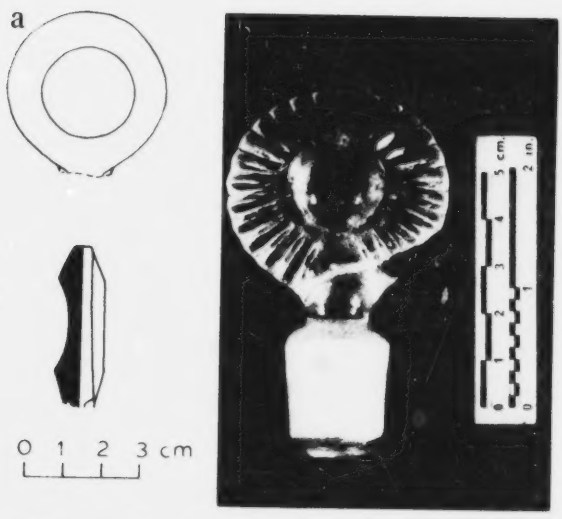


Figure 134. Target stoppers. (a) A plain style. (b) Has been pinched or pinch moulded to decorate the basic shape.

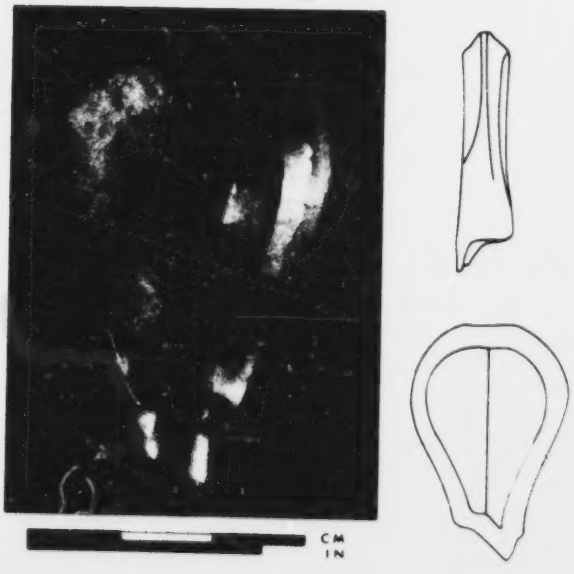


Figure 135. A lozenge stopper which has been decorated to form bevelled edges and to emphasize the lozenge shape. The lower portion of the neck and shank are missing.

Target stopper — This stopper is a variation on the disc stopper, but inherent in the name "target," or "bull's eye," as it is also called, is a depression in the centre of the disc, a feature that in this case is not viewed as decoration.

Lozenge stopper — The finial is a vertical flat baluster shape.

Miscellaneous Glass Stopper Features

Ground shanks — Grinding the shank of a stopper is done to achieve a close fit between it and the inside of the neck of a container. Grinding of glass stoppers has been noted as early as 1665 (McKearin 1971: 123) but apparently it became common practice in England in ca. 1745 (Hughes 1958: 254). Because each stopper is ground to fit the neck of the container with which it will be sold, each stopper is a unique fit.

Hollow, hollow shank — The whole stopper may be hollow with or without an opening at the bottom. Stoppers intended for large-mouthed vessels may have hollow shanks as a result of manufacturing or cost considerations; chemical jars were sometimes advertised with hollow shanks and finials to comfortably fit over a measuring spoon which remained inside the jar, or open hollow stoppers may have been used as a drinking vessel (Newman 1977: 300). In addition the finial can have been blown hollow as decoration, while the shank is solid; this would be referred to as a hollow ball stopper.

Screw-thread stoppers — The stopper shank is threaded; in the example in Figure 138 the threads twist into a hollowed cork. The collar at the base of the neck acts as a stop and sits on top of the cork. These items are called "peg stoppers" in an Illinois Glass Co. catalogue from 1911 and could be covered with corks to fit particular sizes of bottle mouths (Putnam 1965: 81-82). The cork, once jammed into the mouth of the bottle, is expected to be permanently fixed while the glass stopper can be removed and replaced to pour out the contents. The closure is intended to be airtight (see also "Sprinklers, Powder Tubes, and Squirt Tops). Although none are illustrated in this glossary, screw-threaded

Figure 136. Miscellaneous stopper features. Ground shank. The shank of (b) has not been ground.

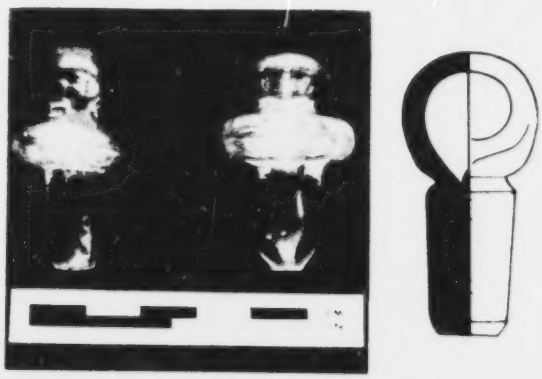


Figure 137. Miscellaneous stopper features: hollow finial.

glass stoppers intended to fit a correspondingly threaded bottle bore are advertised in glass catalogues of the late-19th century. Occasionally screw-threaded bottle bores do appear in assemblages from our sites.

Figure 138. Miscellaneous stopper features. Screw threads. In this example the threads twist into a hollowed cork.

Covers

Although the terms "cover" and "lid" are often used interchangeably in glass literature, we prefer to describe as a "cover" the glass item that sits over the mouth or top of an item of glassware that we categorize as tableware. A "lid" in our terminology performs this function for a bottle or jar. In addition to protecting the contents of a dish, bowl, tumbler, stemmed drinking glass, etc., a glass cover is also an ornamental piece and has been

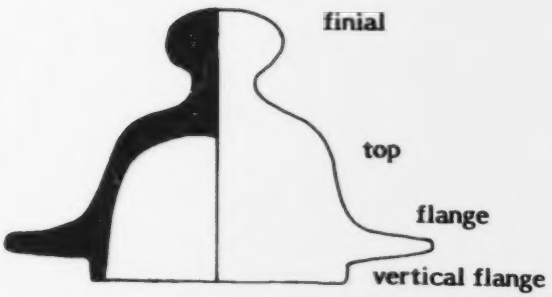


Figure 139. Cover nomenclature.

designed to complement the object it covers in shape and decoration. The tableware object may have a ledge into which or onto which the glass cover was intended to fit.

In describing glass covers one may want to consider the following features: the shape of the top (e.g. dome, flat dome, conical, etc.) and its decoration, interior and/or exterior; the finial or knob shape, for which stopper finial shapes may be applicable, and its decoration; the shape of the rim (e.g. plain, scalloped, etc.); and the length of the vertical flange, whether it is ground, and on which

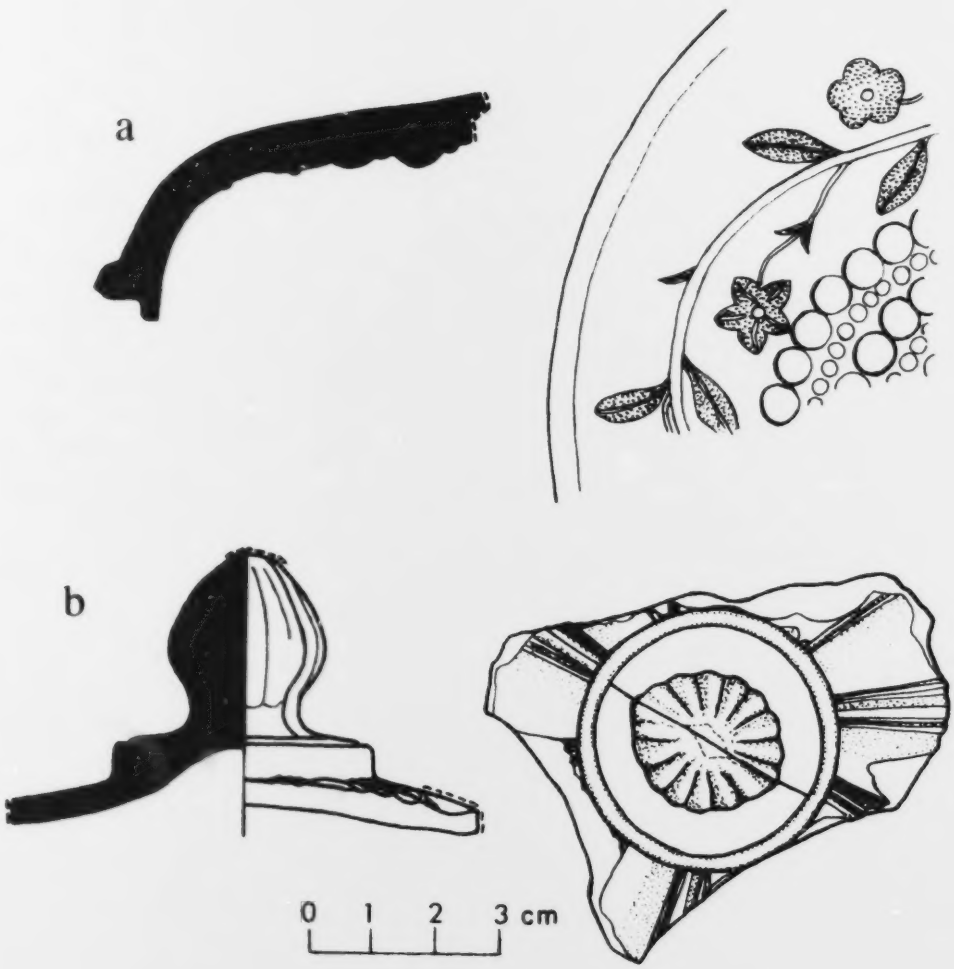


Figure 140. Glass cover fragments. (a) Has a rim, vertical flange, and decoration on the interior surface. (b) The finial on this cover is spire-shaped and decorated and sits on a raised platform or step.

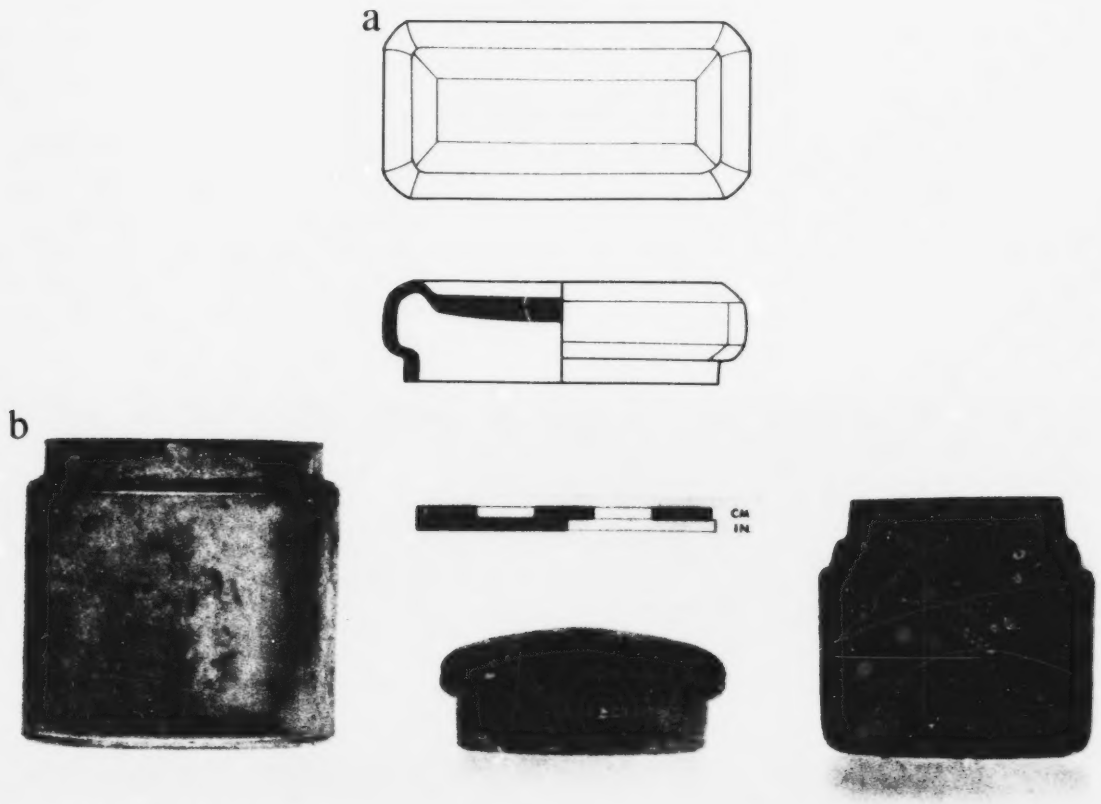


Figure 141. (a) Rectangular-shaped lid with a moulded panel on top and bevelled at the edge of the top and at the rim. (b) Two colourless glass jars and a glass lid which could belong to either jar.

surface. This latter feature would indicate whether the cover was intended to sit on or fit into an object.

Glass covers are not a common find on Parks Canada sites and the fragments from these objects could easily be misidentified, e.g. cover fragments from Grassy Island (12B) resemble pieces of a stemware foot fragment with a folded edge. Generally the presence of a vertical flange and oddly directed glass at the base of the finial are the most telling indications of a glass cover.

Lids

To reduce the confusion caused by the indiscriminate labelling of the glass items which fit over the top of glass vessels as "liner," "lid," or "cover," we suggest that a "liner" is part of a complex closure, a "cover" is the top of a tableware item, and a "lid" is the cover for a container, usually a jar, pot, or box. As a closure the lid stands alone.

The vertical flange of the lid may rest on a ledge part way down the outside of the neck of the container, or the flange may fit inside the lip of the vessel. This flange may have special features such as screw threads or ground surfaces, either internally or externally, to fit the bore of the container.

Descriptions of glass lids should include the horizontal shape (a round lid and a rectangular one are illustrated in Figure 141), the vertical shape (domed, panelled, etc.), decoration, treatment of the vertical flange (e.g. ground on internal surface and bottom), and finial shape, if there is a finial. As well an indication of the lid's dimensions should be noted in an attempt to establish the size of the pot for which the lid was intended.

Glass lids are not common in our collection, probably because other more durable types of closures were preferred.

Liners

A liner is part of a more complex closure and is therefore not a closure on its own. The glass liner was developed in the United States before 1869 (Toulouse 1969a: 350). Its purpose was to shield the food in fruit jars from the metallic taste imparted by direct contact with a metal cap. The glass liner, sandwiched between a metal cap and a rubber ring, was held in place by a screw band or solid cap made of metal. The entire unit supposedly made an airtight seal.

The glass liner in various forms was a part of several patented closures. Liners were made with different types of moulded configurations, depending on the device used to hold them in position on the jar. These configura-

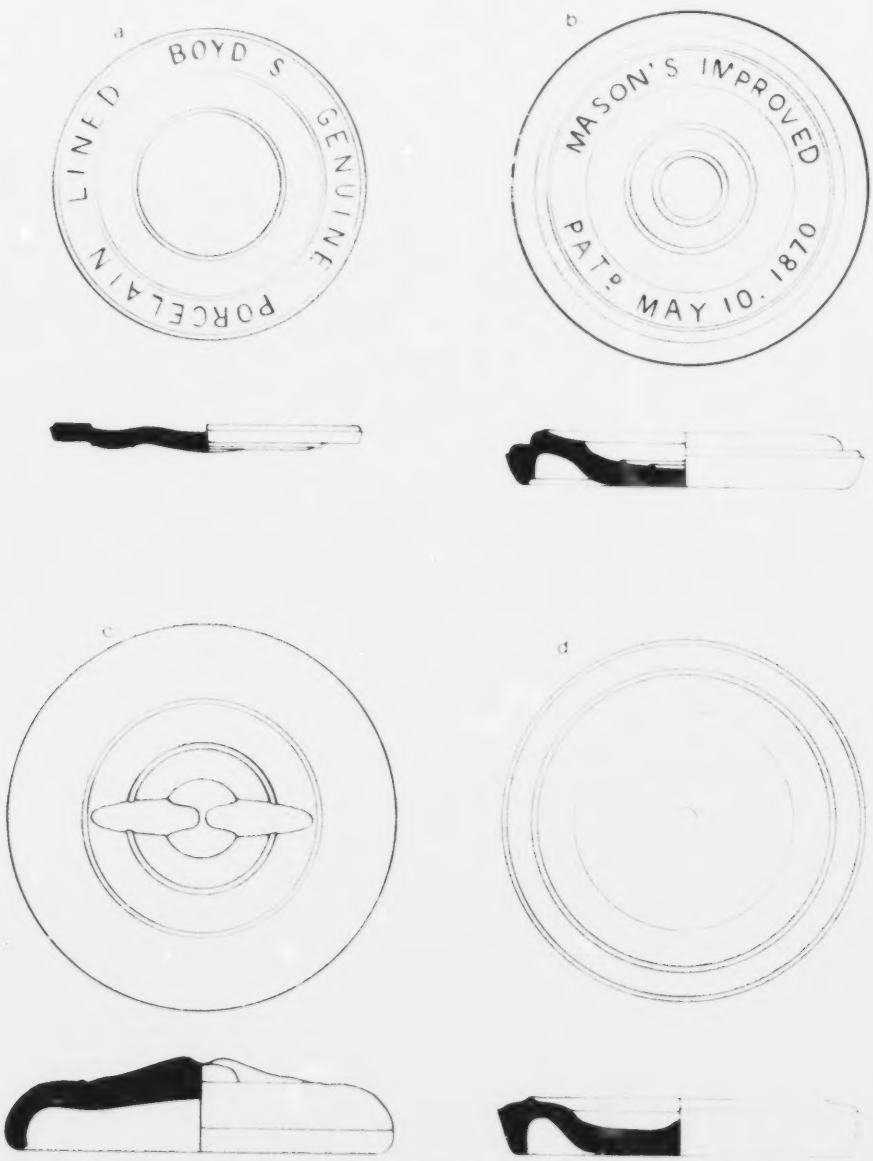


Figure 142. Glass liners. (a) Boyd's Genuine Porcelain Liner in opaque white glass. (b) Mason's improved liner. (c) Liner from a lightning closure showing the moulded centring configuration. (d) Plain glass liner with mamelon.

tions include a central upward projection called a "boss," threaded externally to be covered by a cap (the boss could be perforated to vent air during the food processing), moulded arrangements for centring various wire bails or yokes, and a moulded hole in a raised bump into which a metal thumbscrew on a metal yoke could be fitted. Liners intended to be held in place by a screw band or metal cap can be plain, with or without a vertical flange. The top of the liner may be flat or bevelled towards the centre for snap clips to attach to. Liners can have commercial markings; the glass liner may have been purchased separately from the glass or ceramic jar and the commercial markings may not match.

The individual design on each liner may be of interest in a concentrated study of these items, but for normal cataloguing these details are not usually dealt with. For the present, important features seem to be the commercial marks and their location (e.g. marks on the Boyd's porcelain liner are on the underside of the liner), whether or not the liner has a vertical flange, configurations for a specialized clamp, and the diameter of the liner.

Patented Closures

During the 19th century interest was shown in the improvement of containers and closures, particularly in those intended as packages for foods and beverages. The intent of the various inventors was to produce an airtight package that would not affect the taste and appearance of the contents, to make the package cheaply, and to ensure reliable sizes. The problems encountered with hand-made glass bottles and jars, including variations in the sizes of containers of the same capacity and inconsistent finishes which would not fit standard-size closures, were eventually minimized and eliminated by bottlemaking machines. Until that time invention flourished in Europe and North America, and many and varied were the results.

The patentees' approach to the problem varied. Some, like Mason, developed a bottlemaking mould to produce a finish that would fit the closure; others invented a stoppering device to fit existing finish configurations. Thus it is not always possible to determine the sort of closure that a container was intended to take.

Patented closures can be fitted into a typology, as has been done by Toulouse (1969a); some of these have been selected for inclusion in this glossary. As well, the Dominion Glass Co. Ltd. (post-1913), in a catalogue dating from after 1913, advertises its packers' ware with a limited selection of finish styles to accommodate various closures, and some of these are included here. However, although this group was made by Dominion Glass at this period, it must be remembered that not every foreign patent was licensed to be made in Canada and Canadian glass factories alone did not supply the Canadian market.

Also detailed below are closures that became famous, those that are recovered from Parks Canada's sites with some frequency, and those that required specially adapted finishes. The concentration is on closures that were developed and patented in the late-19th century, although many of these were in use into the 20th century. Some, like the crown closure, are still in use today, either in the original form or in a modified version.

Discs — One of the simplest sorts of closure available is the unparaffined cardboard disc or plug cap used for milk bottles. These require a ledge inside the mouth of the bottle on which to rest (Fig. 56) and are not intended for long distance travelling or long storage. The first American patent for this closure is probably ca. 1901 (Toulouse 1969a: 426). A second type of disc was the Bernardin Metal Cap (the disc) and Neckband, intended to be used over a cork stopper instead of wire. The tin cap portion was round and flat with a central hole; it covered the cork and held it in place without digging into the cork as does taut wire. The neck band was a wide strip of metal attached to the cap, which wrapped around the bottle neck under the string rim. Discs were widely used on beer and ginger ale bottles. Bernardin's closure was patented sometime in the 1880s (Lief 1965: 15).

Codd's ball stopper — The Codd closure required a bottle neck with a complicated internal shape, a glass marble, and a ring of cork or rubber. When the bottle was filled, the ring or washer and the marble were pushed against the groove on the inside of the neck. The contents of the bottle had to be a carbonated beverage to

Figure 143. Codd's ball stopper.

hold the marble stopper in place. The invention was an English one, patented in 1870, and was not popular in the United States although it was much used in England and her colonies (Lief 1965: 14).

Hutchinson spring stopper — The Hutchinson's Patent Spring Soda Bottle Stopper, patented in 1879 in the United States, consists of a loop of heavy wire attached to a rubber gasket. The device sits inside the bottle neck with the tip of the wire loop protruding from the mouth. Once the bottle has been filled the closure is pulled into place, a seal effected internally at the neck-shoulder junction, and the carbonation in the contents keeps the stopper in place. Bottles designed to take this stopper must have shortish necks. The bottle is opened by delivering a sharp blow to the top of the loop. The Hutchinson stopper was adaptable to available bottles with three wire lengths and five washer or gasket sizes and could be re-used until the rubber seal wore out. It was a very successful closure but eventually gave way to the crown, although the two competed into

Figure 144. Hutchinson spring stopper.

the 20th century. Although the original invention was Hutchinson's, an Illinois Glass Co. catalogue of 1911 advertises it as a "Spring Stopper" (Putnam 1965: 195).

Lightning-type closure — An enormously successful bottle closure of the late-19th and early-20th centuries was the Lightning stopper and its variations. The basic invention was originally patented in the United States in 1875 (Toulouse 1969a: 465). A stopper of rubber or porcelain is attached to a wire bail which pivots on either side of the neck under the finish. The lever wire, which hooks into loops in a neck tie-wire used to keep the closure on the bottle, moves up and down to loosen or

Figure 145. Lightning-type closure. The example illustrated is on a beer bottle (Smithsonian Institute Negative No. 72-7155, Collection No. 65.510).

tighten the pivoting wire bail. This closure was apparently too expensive to be used for soft drink bottles but was popular for beer and ale bottles (Lief 1965: 16; Nurnberg 1967: 3). The necessary finish configurations are not complicated, and the Lightning was made in more than one size and in porcelain to fit different sized bottle mouths. There were other Lightning-type closures for small-mouthed bottles patented in the late-19th century, including the Triumph, the Magic, and the Electric, but all worked on the same principle. Lightning-type closures appear ad-

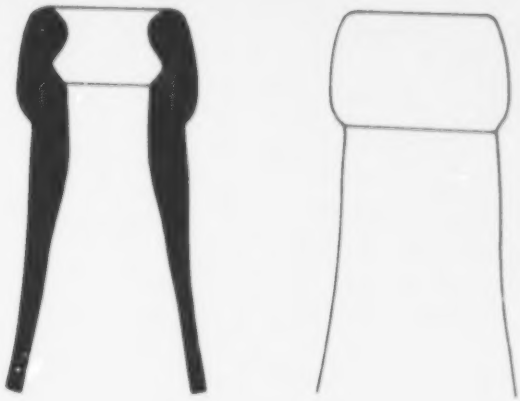


Figure 146. A bottle with a finish for an internal gasket, possibly the Baltimore Loop Seal, patented in the late-19th century by William Painter (Lief 1965: 16-17).

vertised in catalogues in 1911 for beer (Illinois) and after 1913 for ale (Dominion). Lightning-type closures are still used on a limited scale for effervescent beverages in modern times.

Internal gasket — See example in Figure 146.

Crown finish and cap — Patented in 1892 in the United States by William Painter (Lief 1965: 17), the crown cap proved to be the ideal single-use closure for carbonated beverages. The original crowns were plain, unmarked metal, one or both sides lacquered, with approximately 20 corrugations and an internal disc of natural cork. Later crowns had proprietors' marks on them and discs of composition cork, or, in the cap of one of Painter's competitors, linoleum discs. Modern ones may have plastic liners. The crown finish was part of the original patent and is distinctive in appearance. It is a two-part finish with a lip that has a flat top and rounded sides over which the skirt or flange of the crown will hook. Originally crown finishes were hand-made with a finishing tool, and foot-operated crowning machines could reconcile slight variations in lip shapes and sizes to standard crowns. Crown closures appear to have been made in only one size to fit small-mouthed bottles such as sodas and beers. Note: there should not be

Figure 147. Crown finish and cap.

any confusion between the closure used on crown fruit jars and the crown finish and cap.

Kork-n-seal — The kork-n-seal requires a finish with a narrow, protruding lip over which to hook the skirt of the cap. The finish usually has a second part which varies in shape and seems to be largely decorative; there may be other features in addition to these two. The kork-n-seal closure first appears in glassmakers' catalogues of the early-20th century, advertised in sizes to fit bottle openings of 5/8, 1, and 1 1/4 inches. The kork-n-seal was still being supplied and called by that name in recent times (Moody 1963: 185, 190). Its selling point is to the consumer, who can re-use the closure indefinitely on bottles with still or effervescent contents.

Wax sealer — This type was one of the earliest glass jars for home canning, used to preserve foods that were processed after being put in the jar. The grooved lip received hot wax, and a stopper or liner of glass, cork, or metal would be pushed into the wax. Glass liners used for this purpose may show signs of use, e.g. nicks or gouges from being pried off congealed wax. This sort of jar was being produced in glass before 1854 (Toulouse 1969a: 415).

Liner with cap or screw band — Mason's patent of 1858 is generally regarded as the first workable seal of its type (Lief 1965: 9-13). His finish-forming bottle mould produced a jar with embossed threads which began below the top of the bottle and ended above the shoulder. The lip was then ground, without interfering with the

Figure 148. Kork-n-seal finish. The bottle illustrated has a finish designed to take a kork-n-seal lever-type cap.

Figure 149. Wax sealer.

threads, and the jar seal was effected externally, at the shoulder. Originally Mason's jar was intended to take a zinc metal cap, a closure that completely covered and sealed the mouth. However the metallic taste was imparted to the food and was unacceptable, so in 1869 Boyd patented a glass liner for the cap, first in colourless glass, later in opaque white glass called "porcelain" (Toulouse 1969a: 350). There were several fruit jar makers who used Mason's jar patent and his closure or a variation, the most popular of which was a glass liner sitting on a rubber ring and held in place with a screw band, a metal cap without a centre, patented in 1865. The name "Mason" became a generic term for fruit jars with a screw thread finish. Several glassmakers produced their own Mason jars, as Ball Mason's Patent, Ball Perfect Mason, Drey Perfect Mason, Samco Genuine Mason, Anchor Hocking Mason, and so on. Replacement zinc closures were readily available, manufactured as a line of production by a company that did not make the jars; therefore the jar and glass or metal liner may have different commercial marks. The Dominion Glass Company in an early-20th century catalogue offers the following varieties of jar that require such a closure: Improved Gem jars, jars for honey and marmalade, Diamond jars, crown fruit jars (not to be confused with crown finishes and closures), Mason fruit jars, Best jars, and some jelly

Figure 150. Two Mason jars. The earlier version on the left took a zinc metal cap; after 1869 this jar could be had with a glass liner. The jar on the right is a later variation and can still be found in use today.

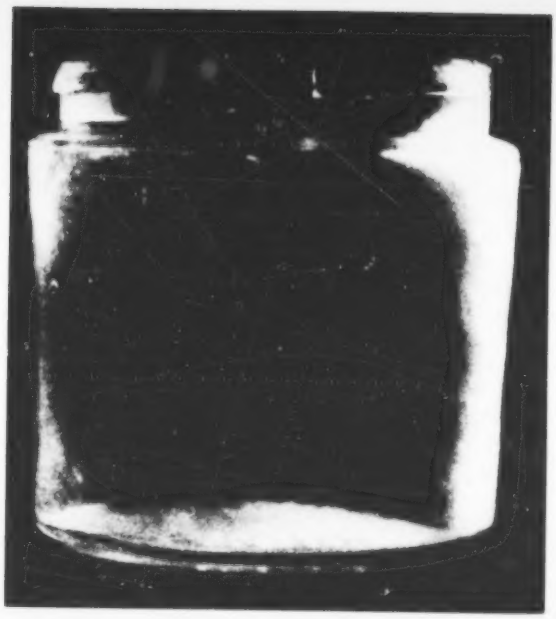


Figure 151. Liner and metal yoke. The illustrated jar has four mould-blown lugs on the neck, sloping and thicker at an end, and might have been intended for a liner and yoke closure.

jars. As well, their pickle and olive jars could be ordered to take any style of closure, including, presumably, this one.

Liner and metal yoke — The elements of this closure type are a glass or metal liner held tightly in place by a wire yoke that lays across the top of the liner. This yoke hooks under helical (i.e. continuous or interrupted spiralling) or flat lugs, on the neck of the jar. Sometimes the lugs have stops to hold the yoke in place; some have serrated bottoms to keep the yoke from slipping. To tighten the closure the yoke is twisted in a motion like a screw cap or band.

Liner and spring clip — This closure type seems to be a variation on the liner and metal yoke type in that the spring clip slides into place, whereas the yoke type twists. This difference will probably be most obvious on the neck of the jar. A jar intended to take a spring clip should have a well-defined bead or ledge encircling the exterior surface of the neck, over which to hook the clip.

Liner and metal yoke with thumbscrew or lever — There are several closure types grouped in this category together; Toulouse (1969a) defines each type and may be consulted if this information is required. Generally these closures consist of a liner of glass or metal and a flat metal or wire yoke that sits over the liner, hooking under two beaded lugs on the neck of the jar or wrapping around two moulded buttons on the jar neck. The yoke is tightened in position either by a thumbscrew in the centre of the yoke, which presses down the

Figure 152. Lightning-type closure. Illustrated is a Perfect Seal jar with Lightning-type closure and glass liner.

liner in its centre, or by a lever or two on the top or side of the jar, which, by lowering, takes up the slack in the yoke (see Toulouse 1969a: 48-96).

Liner and spring bail — The spring bail is a wire member fastened to the jar in such a way that it can be moved back and forth. The wire may be attached to buttons on the neck, it may hook into dimples in the jar, or the bail may be anchored to the jar by passing through a groove in the base of the jar. The bail is tightened on the jar by being forced over a projection on the liner and held in place by a groove in the projection. These projections can take some rather odd forms and are very distinctive in appearance (see Toulouse 1969a: 471-73).

Lightning-type closure — Working on concepts originally incorporated in a patented closure for bottles, the Lightning closure appeared on fruit jars of the same name by 1877 (Toulouse 1969a: 466). To be used on jars, the closure requires an independent glass liner with a moulded central ridge to hold the wire bail in position. The bail and lever wire work in the same way as on bottles. The closure was very successful for fruit jars and for bottles, and its imitators replaced the neck tie-wires with moulded dimples or moulded buttons on the neck of the jar. Lightning clamps were also adapted to hold down other glass liners (see Toulouse 1969a: 184).

PART V. FLAT GLASS

CATEGORY

Flat glass — This category refers to windows and to mirrors and pieces of such articles and is not used for describing pieces of flat-sided containers, tableware, lenses, etc.

SUBCATEGORY

Two types of flat glass are commonly recovered from archaeological sites, i.e. window glass and mirrors. Unless there remains some indication of the silvering on the back, mirror fragments are usually indistinguishable from window glass fragments. However mirrors tended to be made from plate glass, which should be kept in mind when looking at pre-19th century assemblages. In that period it would be unusual for North American dwellings to have plate glass windows. Because mirrors are made with either window or plate glass, the rest of this discussion can drop the distinction between mirrors and windows.

MANUFACTURE

Until the 20th century window glass was either blown or cast. Blown window glass was produced by two processes, the crown method and cylinder blowing. Both of these processes are described in many sources (Roenke 1978: 5-9; Wilson 1972: 44-56).

Distinguishing between crown and cylinder glass is difficult unless certain parts of the glass are present. With crown glass, the product of the glassblower was a round "table" of glass with a "bull's-eye" in the centre where the pontil was attached to it. The "bull's-eye" will be thicker and have a rough breakaway from the pontil rod. If part of the rim from crown glass is present, it will be curved and beaded at the rim. Cylinder glass was blown in a cylinder, the ends removed, a line cut down the length of the cylinder, and then it was opened into a flat sheet. This process stretches the inside surface and compacts the outside surface, sometimes causing an uneven surface quality to the glass, but a fairly large piece is needed to identify the glass as being cylinder made.

Cylinder and crown window glass were produced in both England and France. In England, crown glass came into popularity in the last quarter of the 17th century and lasted well into the 19th century, when cylinder glass again became dominant. This also appears true for window glass production in the United States. Towards the end of the 19th century mechanical means were developed for blowing cylinder glass. By 1903 the Lubbers Cylinder blowing machine could produce cylinders 40 feet (1 foot = 0.3048 m) in length and 40 inches (1 inch = 25.4 mm) in diameter (Douglas 1958: 678).

Plate glass is the third major type of flat glass recovered from archaeological sites. It was produced by casting molten glass on huge metal tables. The resulting plate of glass had a clouded surface from contact with the metal and air cooling. Finishing plate glass meant grinding and polishing both surfaces and the resulting produce was not cheap. Production of plate glass in France developed with the aid of Venetian glassmen and government encouragement in the 1660s (Scoville 1950: 27; Barber 1977: 13-33). Large-scale, continuous English plate glass production began in the late-18th century. Because plate glass was fairly expensive compared with crown and cylinder glass, it is fairly rare on our sites. When fragments of plate glass are recovered, one should always keep in mind that they may be from mirrors. A couple of attributes help in distinguishing plate glass from other window glass: plate glass tends to be two to four times thicker than other flat glass and its surfaces may still show signs of having been polished; occasionally the edges of plate glass panes are ground to a bevelled edge.

WINDOW GLASS

Rarely are whole window panes recovered from excavations. However, it is not uncommon to recover pieces that can give one dimension, either the width or length. This should always be recorded as it could be helpful in restoration. If a small excavation unit such as a trash pit has what appears to be the remains of one piece of window glass, then it might be worthwhile fitting enough together to enable measurement of length and width.

Window glass in the 17th and 18th centuries often came in the form of small panes, cut in diamond, triangular, and other shapes. This type of window glass often was framed with lead caming. If the glass can be examined before it has been cleaned, the edges of the glass sometimes have differential patination from where the lead caming held it in the casement. This sometimes enables the researcher to recognize acute angles that were intended as opposed to those resulting from accidental breakage. Such angles should be recorded to help in reconstructing what the window would have looked like.

Thickness of window glass has lately come under consideration as a chronological variable. Karl G. Roenke undertook a massive study of 19th century window glass from sites in the Pacific Northwest of the United States. Over 21 000 fragments of window glass from 15 sites were each measured in three places for thickness. These measurements were taken in increments of 0.01 inch. Plotting of this data has demonstrated an increasing thickness in pane glass through the 19th century (Roenke 1978: 51). However the primary model thickness for each site never involved more than 45% of the pane glass sample and in 12 of the 15 collections it was less than one-third of the site sample. This suggests that one should have a fairly large sample of window glass before attempting to use it as a chronological tool. Roenke makes the point that his chronology has been worked out for one geographic region and that it may not work for other areas. As well, experience has shown that when enough pane glass has been recovered from a feature or level to consider using it for chronological purposes, there usually is also an abundance of more datable artifacts such as ceramics or glass vessels. The very nature of window glass suggests that one should take great pains to avoid using it for dating except under special situations. Window panes generally have a long artifact life. It would not be unusual for window panes to last over 50 years before being broken and discarded. In other words if you have a trash pit with window glass, ceramics, and bottle glass and you dated all three groups, you would expect the window glass to date considerably earlier than the other artifacts. It is suggested that attempts at dating window glass should be restricted to such situations as association with a building when a possible date of construction is wanted. Another possibility for useful information from window glass thickness would be as a suggestion of roughly when a site was first occupied. In almost all other cases it is difficult to see much value in measuring thickness of window glass.

Window Glass Treatments

Decorated flat glass — Plate glass is sometimes decorated by press moulding designs on one surface, sand blasting, or by chipping one surface with a glue and heat process. All of these types of decoration are meant to leave the glass translucent but not transparent. This type of glass is often associated with commercial structures such as banks or office buildings. In domestic dwellings it is associated with bathroom windows. A second major type of decorated flat glass is the coloured glass which can be found in domestic dwellings dating in the later part of the 19th century or in churches. Recovery of decorated flat glass has not been in sufficient quantity to warrant working out a chronology of its development.

Prism glass — This form of flat glass was developed as an aid to directing sunlight by bending it as it passes through the window. Its use would be for commercial buildings on lower levels which are partly blocked from the sunlight by tall buildings or other obstructions. One surface of the pane presents a parallel series of prisms while the other is smooth.

Wired window glass — This type of glass was developed in the 1880s for strength and security (Pittsburgh Plate Glass Co. 1923: 138). The wire, which resembles chicken wire, is embedded in the glass. Uses for this type of glass are mostly in industrial and commercial structures for such things as sky lights, elevator windows, and factory windows. Wired glass often has a moulded decorated surface.

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This glossary defines terms used in catalogue records and reports by Parks Canada personnel for the description of glass containers, tableware, flat glass, and closures from archaeological sites. Included in the glossary are suggested functional classifications for glass artifacts, as well as discussions of glass composition, manufacturing techniques and their date ranges, decorative techniques, and motifs. Shape definitions and suggested measurements have been given for the various container parts. Tableware forms and usages are defined. The various types of closures used on containers and tableware in the 18th, 19th, and 20th centuries are discussed, as is the description and dating of window glass.

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